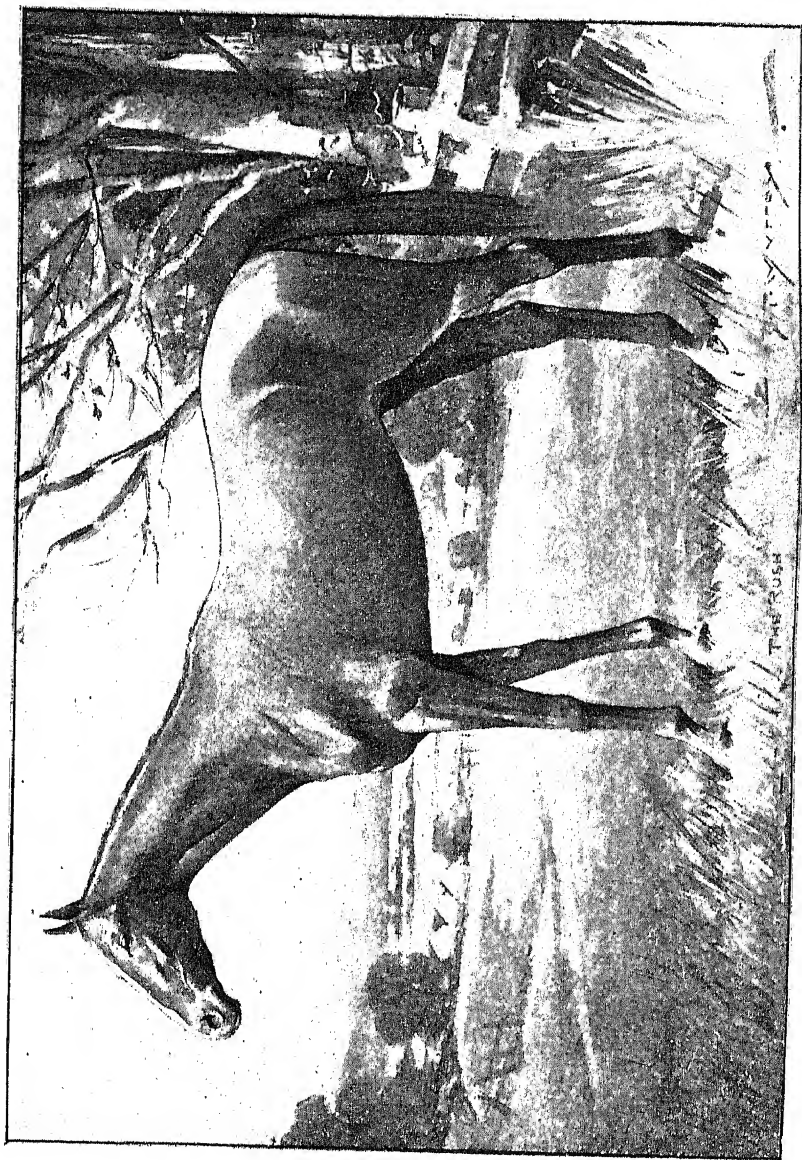


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ELEMENTARY LECTURES ON  
VETERINARY SCIENCE

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ELEMENTARY LECTURES ON  
VETERINARY SCIENCE



THE RUSH.  
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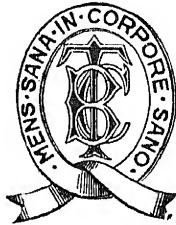
[Frontispiece.]

ELEMENTARY LECTURES  
ON  
VETERINARY SCIENCE

FOR  
AGRICULTURAL STUDENTS, FARMERS,  
AND STOCK-KEEPERS

BY  
HENRY THOMPSON, M.R.C.V.S.  
LECTURER ON VETERINARY SCIENCE AT THE ASPATRIA AGRICULTURAL COLLEGE

*FOURTH EDITION*



LONDON  
BAILLIÈRE, TINDALL AND COX  
8, HENRIETTA STREET, COVENT GARDEN

1913

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TO  
GEORGE C. DOBELL, ESQ.  
LIVERPOOL.

AS A TRIBUTE OF HIS GREAT LOVE OF THE HORSE  
AND IN ACKNOWLEDGMENT OF A LIFE-LONG FRIENDSHIP  
THIS WORK IS DEDICATED.



## PREFACE TO FOURTH EDITION

OWING to the increased popularity of this work as a text-book amongst students attending the Agricultural Colleges (both Home and Colonial), the Third Edition issued in 1908 has been taken up so readily that a Fourth Edition has already been called for.

For technical reasons it has been found necessary to redraw all the Plates. This has been ably accomplished by Mr. D. C. Bluett, of Prestwood, Great Missenden; and as the Author holds strongly to the old view, that the Eye is more faithful than the Ear, a few more typical illustrations with reference to the horse have been added, viz.: 'Choking,' 'Lockjaw,' 'Loop Twist and Knot of the Small Intestine,' 'A Collection of Intestinal Calculi,' 'Rheumatic Periostitis of the Neck Bones,' 'Fracture of the Long Pastern,' 'Parasites,' etc.

The text has also been carefully revised throughout, and many paragraphs enlarged, whilst special reference has been made to the new mode of treatment and prevention of disease by Vaccine and Serum Therapy, or the inoculation of animals with specially prepared Vaccines and Serums.

It is hoped that the improved form in which the work is now issued will make it even more useful in the future than it has proved in the past.

HENRY THOMPSON.

ASPATRIA,  
*January, 1913.*

## PREFACE TO THIRD EDITION

As the First and Second Editions of this work, published respectively in 1895 and 1902, have met with such a ready sale both at home and abroad, and the demand for the book has been so encouraging, I have been induced by the publishers to issue a Third Edition. I have thoroughly revised the earlier work, rewritten and enlarged the articles on Anthrax, Actinomycosis, Bots, Braxy, and Louping Ill in Sheep, White Scour in Calves, etc., and rearranged the paragraphs on The Derangements and Diseases of the Generative Organs. Several new plates have been added, showing microscopic sections of the Anthrax Bacilli and Actinomycosis, with photographic blocks of Tubercular Disease of the Spleen and Mesentery of the Horse, of Bots, Fœtal Monstrosities, Strangulated Intestine, etc., so that the work may now be looked upon as being not only an up-to-date text-book for the agricultural student, horse-owner, and stock-breeder, but also as a ready reference for the rising young country practitioner.

As stated in the Preface to the First Edition, I still hold to the opinion that it is the duty of veterinary surgeons to instruct their clients as to the best mode of preventing diseases among their stock, and to caution them against the injudicious use of advertised patent medicines; also, when the nature of a case is not clear, to call in without delay the aid of the qualified practitioner.

The work being originally the outcome of lectures, the old titles are still retained in the place of chapters, and to make it more serviceable for ready reference the paragraphs are numbered and a definition of each separate malady given. The book is divided into twelve sections, supplemented with appendices and an exhaustive

## PREFACE TO THIRD EDITION

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index. Each section is devoted to one particular portion of the body. The general anatomy and functions are briefly reviewed, followed by a description of the symptoms and 'First Aid' treatment of the various ailments common to the part.

The appendices are divided into three—(A) Synopsis of Diseases: their Recognition and 'First Aid' Treatment; (B) Medicines: their Terms, Actions, Formulas, and Doses; and (C) Various Forms of Manual Aid, Instruments, and Operations.

I would specially note that, though the work is primarily based on half a century's practice, I have also referred to the works and publications of various authorities, and trust this general reference will be accepted by all as an acknowledgment of my indebtedness.

The illustrations have been prepared by Mr. J. Murray, of Edinburgh, to whom I am indebted for the care taken in their production.

H. THOMPSON.

BEACON VIEW, ASPATRIA,  
*December, 1907.*

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## PREFACE TO FIRST EDITION

THE idea of issuing, in book form, these Lectures—which were delivered at various centres, by instructions from the County Councils of Cumberland, Westmorland, and Lancashire—was first suggested by A. B. Dixon, Esq., J.P., Abbots Reading, near Ulverston, the Chairman of the meetings at Bouth. Shorthand notes of the lectures, taken at the time of delivery, form the basis of the book.

The work is of an elementary character, and the remarks on the various subjects brief, thus making it suitable for the use of students attending agricultural colleges, and for farmers and stock-keepers generally.

Although much adverse criticism has been advanced as to the wisdom of veterinary surgeons giving lectures and demonstrations under County Councils, the author considers that it is a duty, not

only to instruct the people as to the best modes of preventing disease, but also to caution and guard them against the use, amongst their stock, of advertised quack medicines, the composition of which they know nothing.

It is well known that persons are found who profess to know something about diseases and the action of medicines, and when an animal is found ailing such individuals make an attempt to cure. Knowing from experience the often disastrous results from such treatment, the author has, as first aids for some of the maladies, recommended simple remedies, which, in practice, have been found beneficial.

Many of the ideas put forward are by no means generally accepted, notably the writer's opinion of germs and their action on the animal economy; he still holds that certain hygienic conditions and environments are required to render the body of the animal favourable to the entrance and subsequent development of these microbes.

To make the text more plain, especially in the case of Parturition, pen-and-ink illustrations (the work of amateurs) have been added.

BEACON VIEW,  
ASPATRIA, 1895.

H. T.

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# VETERINARY LECTURES FOR AGRICULTURAL STUDENTS

## LECTURE I

### INTRODUCTION

1. ALL the functions and actions of a living body are, more or less, due to a stimulus or irritant of a vital character directly or indirectly applied ; and from the peculiarity of the magnetism which surrounds our globe, and its influence on inorganic and organic material, **electricity** may be looked upon as *the* vital stimulus of organic life. From electricity we have light, heat, motion, etc., and by its agency the two great important gases, *oxygen* and *hydrogen*, are combined to form water ; again, by its aid water can be decomposed into its elements. Thus, then, we derive from electricity light, heat, moisture, and motion, *the* essentials of *vitality*. By the aid of electricity, also, sensation and motion can be restored to a partially paralyzed limb ; and when the electric current is made too powerful life is destroyed. There is also to be considered the extraordinary action of the X rays.

2. **Life** may be defined as an electro-vital phenomenon peculiar to an organism which includes the powers of *absorption*, *assimilation*, *secretion*, *excretion*, and *reproduction* ; and **death** is the cessation of all these functions, with the return of the organic tissues to their ultimate elements.

3. **Chemistry**.—On the various constituents of the living body being subjected to chemical analysis, some sixteen of the elementary bodies are found to enter into their composition, and are as follows : Oxygen, hydrogen, nitrogen, carbon, potassium, sodium, calcium,

magnesium, lithium, manganese, sulphur, phosphorus, iron, chlorine, silicon, and fluorine. These inorganic bodies, which vary very much both in proportion and combination, are not in themselves alive, yet by their subtle physico-chemical affinities, their atomic electro-activity, or vital combination (vital force), all the gases, fluids, and solids of the organic structures of the living body are produced.

4. **Cell.**—A minute sac containing a fine network of granular protoplasm. Cells vary in formation according to the structure in which they are found. A simple cell, whether vegetable or animal, seems to have an innate power of a vital character to reproduce, and by the multiplication, when the surroundings are replete with every necessary, tissues and the various organs of the body are formed, and when all are in normal condition healthy functions are carried on.

5. **Microscope.**—By the aid of this instrument the cells of the various tissues are revealed and recognized, and they are almost innumerable. Meinert estimated the grey matter of the brain alone to contain no less than 600,000,000 cells; and, again, each cell was divided and subdivided into molecules and atoms respectively, while between two and three hundreds of trillions of red and white corpuscles were found in the blood of the adult horse. The living body is strangely and wonderfully made.

‘It is strange that a harp of a thousand strings should keep in tune so long.’

6. **Histology** is a description of the minute structures of the body, and is not the province of this work. Yet before we can undertake the treatment of the various afflictions which domestic animals are prone to, and which are studied under *pathology*, a knowledge of *anatomy* and *physiology* is necessary. But this will be of a very brief and practical character, the object being that, when describing the different ailments, some little idea of the parts of the body alluded to may have already been gained.

7. **Anatomy** treats of the various portions and structures of the body, and is both general and descriptive, comparative and morbid. General or regional anatomy deals merely with the name and situation of the different organs and parts of the body. Descriptive

anatomy enters into a minute detail of their forms and structures, and gives a systematic description of the parts; while morbid anatomy is the study of diseased or morbid structures, and under comparative anatomy a comparison of the structures of various animals are made.

8. **Physiology** is the study of the functions or the work that the different organs of the body perform in health. Thus, the function of the liver is to secrete bile; the kidneys, urine; and the mammary glands, milk, etc.

9. **Pathology** treats of the derangements and diseases of these structures and functions, and is the principal object of this work. To make the subject better understood, it is here divided into various sections, the general anatomy and physiology of the different parts being at the same time briefly touched upon.

### ARRANGEMENT OF LECTURES.

10. The various subjects to be dealt with in these lectures will be taken up in the following order:

- (1) **Introductory**.—Inflammation; Terminations; Causes; Fever Treatment.
- (2) **Bones**.—Ligaments and Joints; Injuries and Diseases.
- (3) **Muscles (Flesh)**.—Tendons or Sinews; Injuries and Diseases.
- (4) **Feet**.—Horny Hoof and Shoeing; Injuries and Diseases.
- (5) **Digestive Organs (Horse)**.—Mouth and Stomach; Injuries, Derangements, and Diseases.
- (6) **Digestive Organs (Cow)**.—Stomach, etc.; Injuries, Derangements, and Diseases.
- (7) **Dentition** and the Use of Artificial Foods.
- (8) **Circulation**.—Heart, Arteries, Capillaries, and Veins; Diseases, etc.
- (9) **Respiration**.—Lungs; Bronchial Tubes; Diseases.
- (10) **Nerves**.—Brain, Eye, and Ear; Diseases.

(11) **Skin.**—Hair Follicles, Sweat Glands, etc.; Affections; Diseases.

(12) **Urinary and Generative Organs.**—Parturition and Diseases.

11. **Nutrition** is the process by which all organic structures, whether vegetable or animal, are developed, replenished, and reproduced—*i.e.*, nutritive development, nutritive repletion, and nutritive reproduction. When all the various structures are in a normal condition, the body may be said to be in a state of *health*, to maintain which certain materials are necessary so as to replace the changes of matter (more or less accelerated) that are ever going on, as there is not a thought or a movement of the body without some expenditure of tissue. This tissue must be, and is, renewed by the process of nutrition, which is upheld and carried on by means of the food taken into the stomach, which, when digested and subjected to the secretions of the various glands connected with the digestive organs, is transformed into suitable material, which may be either stored for future use, or pass directly into the blood in combination with lymph from the absorbent vessels, and by means of the circulation the new materials are brought in direct contact with the minute cells of the various tissues of the body. Each cell with its atomic activity and selective power extracts its own suitable pabulum for its own special function, while it passes the waste product (debris) into the blood-stream to be eliminated from the body by the excretory organs (see Digestive Organs). In the animal kingdom, before healthy nutrition can be successfully maintained, certain conditions are required, viz.:

- (1) The part to be nourished must be in proper state of health.
- (2) The blood must be pure, and not too far distant. (There are some structures into which the blood does not go, it only flows *near*; for instance, the cartilage covering the ends of bones in the formation of joints. In such cases nutrition is carried on by 'imbibition,' or sucking up.)

- (3) The temperature or heat of the part must be normal. (If the part shows a temperature higher than the normal and natural, then healthy assimilation is interfered with. On the other hand, every one has read of a man's toes being frozen off in the Arctic regions through extreme cold, thus showing the necessity of normal heat.)
- (4) All parts must be under the control or influence of the nervous system.

12. Circumstances are, however, constantly arising which interfere with the equilibrium of these functions, and then a perverted nutritive process is established, disorder and disease being the result; hence, health and disease are so intimately blended—like daylight and darkness—that we cannot tell when one ends and the other begins.

### DEFINITION OF TERMS.

13. Before proceeding further, it will be necessary to note and define certain terms which are in general use in the veterinary profession.

- (1) **Pathology** is the study of disease and its locality—the science of the nature, causes, and remedies of diseases.
- (2) **Etiology** shows the various causes of disease—external, internal, mechanical, chemical, climatic, predisposing, predisposition, hereditary, exciting, age, sex, etc.
- (3) **Symptomatology** gives the various symptoms, negative and positive. In some cases there are very definite symptoms, which indicate clearly the nature of an ailment; in others the indications are few, and lead to no definite conclusion. In such a case the practitioner resorts to the negative method; the absence of certain symptoms shows that the malady is not so-and-so. Thus, he can exclude certain complaints from being the actual one until the choice is brought down



to a few possible diseases only. The thermometer is of great utility in this department.

- (4) **Prognosis** means the prediction of probable progress and result of a malady.
- (5) **Therapeutics** is the branch of medicine concerned in the treatment of diseases.
- (6) **Hygiene** treats of ventilation, sanitation, clothing, dieting, nursing, etc.; in fact, all items for the maintenance of health and its preservation.
- (7) **Epizootic**, or **Epidemic**, is a term used when a disease is very prevalent, attacking many people or animals at the same time—*e.g.*, influenza, pleuro-pneumonia, and foot and mouth disease.
- (8) **Enzootic** refers to diseases confined to certain localities—ague in man, red water in cows, louping-ill and braxy in sheep, etc.
- (9) **Specific** is a term used when the disease arises from some specific germ—*i.e.*, glanders, pleuro-pneumonia, anthrax, etc.
- (10) **Sporadic** refers to diseases generally, occurring daily—*e.g.*, simple inflammation of the bowels, lungs, and feet, plagues, etc.

There are other terms used, but the foregoing are quite sufficient.

14. Before reviewing some of the injuries, derangements, and diseases of the different organs of the body, I shall first refer briefly to that extensive and most important subject—*inflammation*.

15. **Inflammation** may be defined as an increased nutritive action in the first stage; secondly, perverted atomic change in the tissues of a part, with *heat, pain, redness, and swelling*, and is the most common disturbance affecting the organs of the animal creation. And yet inflammation, like fire or water, is a good servant as well as a bad master, and may be looked upon both as reparative and destructive. Without its aid the ends of fractured bones would not unite, nor would surgical operations result successfully, if it was not

for the inflammatory adhesive exudate that favours the formation of a new connective tissue. The practitioner performs the operation, and trusts to Nature and reparative inflammation to accomplish the rest. Wounds, however simple, in horses and cattle seldom or never heal without inflammatory action. If, however, the practitioner cannot keep the inflammation under control, instead of the reparative process, destructive inflammation may be set up. When a part is irritated, the small bloodvessels, called capillaries, first contract, then dilate, and this, by some, is said to be the first action of inflammation. But about this point there is difference of opinion, as others say the vessels dilate first. That contraction of the bloodvessels, is the first process, is well exemplified when the end of a finger is suddenly snapped off by machinery, or a gash is quickly made in the flesh, for then the neighbouring parts become perfectly pale, and no blood is seen to flow from the wound for a few moments owing to the sudden contraction of the vessels from the shock. Dilatation next takes place when the blood comes freely. If the irritation or cause be not removed, the bloodvessels become distended, and finally paralyzed. The corpuscles crowd into the part, and becoming adhesive—sticking together, as it were—induce further expansion of the vessels.

16. **Congestion**, or accumulation of the blood, now takes place with the exudation or oozing of the fluid portions of the blood through the sides of the vessels into the surrounding tissues; or the vessels may ultimately give way, with extravasation of blood into the parts, and from the consequent pressure the nerve filaments lose their controlling power, and the structure becomes changed. That the minute tissues play an important part in inflammation cannot be doubted, because the blood, before it reaches and after it leaves the inflamed portion, is the same as that in the uninfamed parts of the body.

17. The noted external local signs of inflammation are *heat, pain, redness, and swelling*.

18. **Heat** is caused by the large amount of blood sent to the affected part, and the consequent increased chemical action that

follows. The heat is not, however, so great as is thought, for the temperature does not increase more than  $2^{\circ}$  or  $3^{\circ}$ ; and yet in an inflamed foot there is a perceptible increase of heat. We can, however, have heat without inflammation, as the body often becomes heated from exercise or hard work.

19. **Pain** is owing to the irritation of nerve fibres, from the pressure caused by the distension of the effused blood materials. Pain, however, varies in different portions of the body: it may be reflex and far distant from the affected part; in some places it is dull, as when the mucous membranes are inflamed; but when fibro-serous or serous membranes are affected, as in rheumatism and pleurisy, the pain is most acute and at times throbbing. Bone in health is almost non-sensitive, but when under inflammation, from its unyielding nature, the pain is excruciating. But we can have pain without inflammation; for instance, as in cramp or spasm.

20. **Redness** is due to the accumulation of blood, coupled with a distension of the vessels and a crowding of red corpuscles in the part, and, finally, extravasation into the structures. Yet we can have redness without inflammation.

21. **Swelling** arises from many causes, but in inflammation it is occasioned by the congestion and exudation of the serous or watery portions of the blood, and extravasation of the blood itself, owing to the coats of the distended vessels giving way. Still, we have swelling in various parts of the body without inflammation—as in dropsy, from debility; swelling of the legs, from plugging of bloodvessels or want of tone in the tissues; or the swellings of blains or ‘howkes’ (nettle-rash) in cattle.

22. Yet, when all these signs are found combined—*i.e.*, heat, pain, redness, and swelling—they are characteristic of inflammation, and cause more or less constitutional disturbance in the body, with a certain amount of fever, according to the situation and nature of the attack.

23. Inflammation is of various kinds, such as **acute** (sharp and quick), **sub-acute** (not quite so active), and **chronic** (of a slow

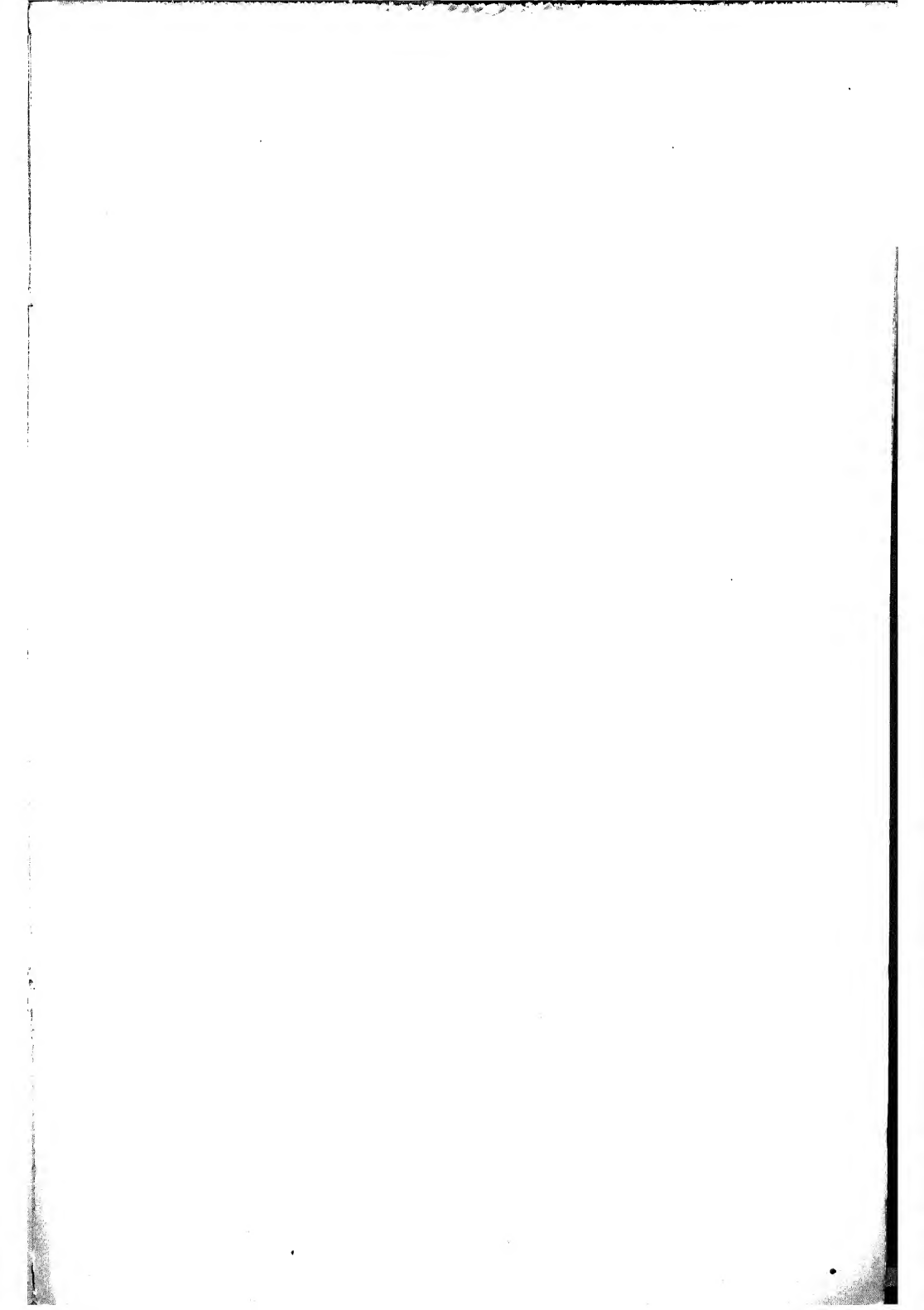
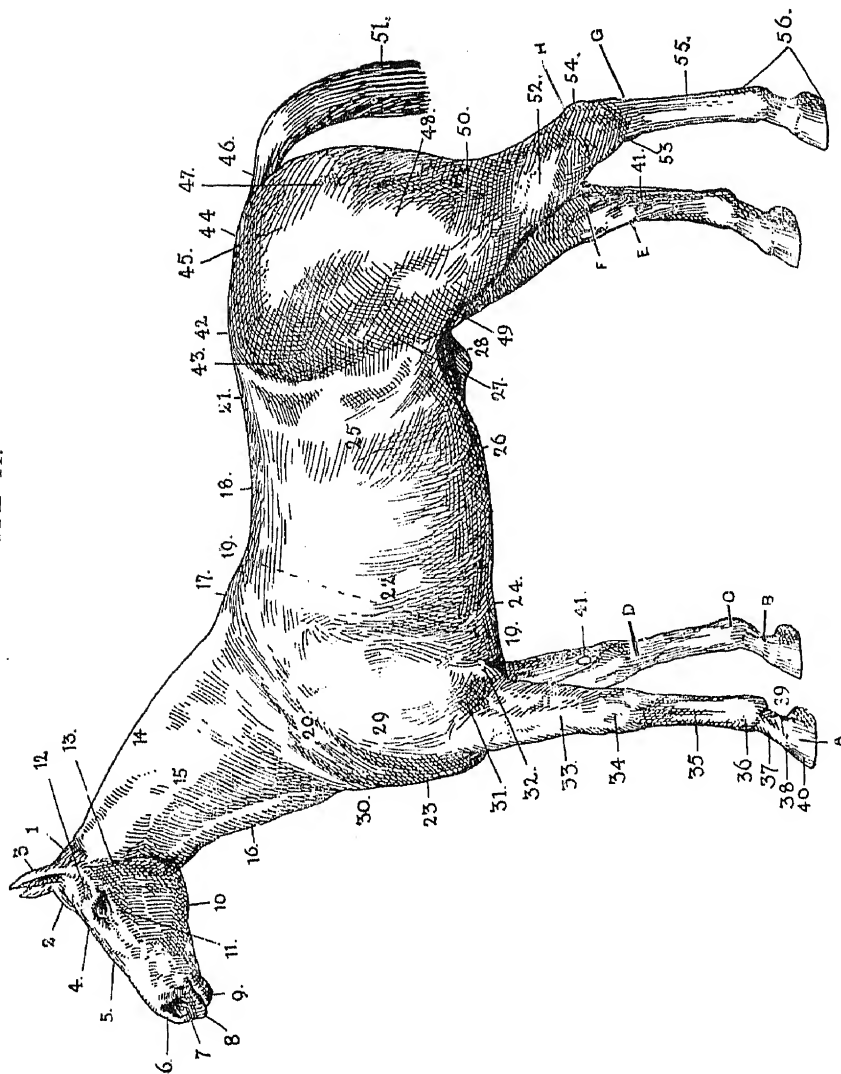


PLATE II.



## EXPLANATION OF PLATE II

### POINTS OF A HORSE

- |   |                                |
|---|--------------------------------|
| 1. Nape of the Neck or Poll.            | 29. Shoulder.                  |
| 2. Forelock.                            | 30. Point of Shoulder.         |
| 3. Ears.                                | 31. True Arm.                  |
| 4. Forehead.                            | 32. Elbow.                     |
| 5. Face.                                | 33. Fore-Arm.                  |
| 6. Muzzle.                              | 34. Knee.                      |
| 7. Nostril.                             | 35. Shank or Cannon Bone.      |
| 8. Upper Lip.                           | 36. Fetlock-Joint.             |
| 9. Under Lip.                           | 37. Pastern.                   |
| 10. Lower Jaw.                          | 38. Coronet.                   |
| 11. Zygomatic Ridge.                    | 39. Heels.                     |
| 12. Hollow above the Eye.               | 40. Hoof.                      |
| 13. Maxillary Joint.                    | 41. Chestnut.                  |
| 14. Mane or Crest.                      | 42. Haunch.                    |
| 15. Neck.                               | 43. Point of Hip-Bone.         |
| 16. Throat or Windpipe.                 | 44. Croup.                     |
| 17. Withers.                            | 45. Rump.                      |
| 18. Back.                               | 46. Root of Tail or Dock.      |
| 19. Girth or Chest Measurement.         | 47. Hip-Joint.                 |
| 20. Shoulder Blade.                     | 48. Upper Thigh.               |
| 21. The Loins.                          | 49. Stifle.                    |
| 22. Side of Chest.                      | 50. Lower Buttocks.            |
| 23. The Chest or Breast.                | 51. Hair of the Tail.          |
| 24. Floor of Chest.                     | 43-50. Quarter.                |
| 25. Barrel, Front Ribs, and Short Ribs. | 52. Lower Thigh.               |
| 26. Abdomen.                            | 53. Hock.                      |
| 27. Flank.                              | 54. Point of Hock or Hough.    |
| 28. Sheath.                             | 55. Back Sinew or Tendon.      |
|   | 56. Growth of Hair—Feathering. |

### THE SEATS OF THE COMMON DISEASES ARE—

- |               |                  |
|---------------|------------------|
| A. Side Bone. | E. Spavin.       |
| B. Ring Bone. | F. Thorough Pin. |
| C. Windgall.  | G. Curb.         |
| D. Splint.    | H. Capped Hock.  |

character). Again, the temperament and condition of different animals influence the nature and degree of the inflammation. In strong, robust, and well-fed animals the attack may be of a **sthenic**, or high order, marked by morbid overaction; whilst in old, ill-fed, and weakly constituted subjects, the nature of the attack is likely to be of an **asthenic**, or low character, marked by weakness, thus showing how important the study of all these variations is to the trained practitioner, as they require entirely different modes of treatment. No one would think of treating a strong, robust, well-fed animal in the same way as he would a weak, debilitated one, although both may be suffering from the same complaint and show the same temperature. Our great object and aim is to bring the inflammation to its most favourable termination with the least destruction of tissue or life. The terminations of inflammation are said to be—(1) *Resolution*, (2) *exudation* and *adhesion*, (3) *effusion*, (4) *suppuration*, (5) *ulceration*, and (6) *gangrene* or *mortification* (death of a part). Some writers object to the phrase ‘terminations of inflammation,’ and use instead the words ‘results’ or ‘effects.’

24. **Resolution.**—Resolution means the subsidence of the morbid process. Our greatest endeavour should be to get the inflammatory action to this termination, as being the most satisfactory. If possible, find the cause and remove it, when the effect will cease, and the inflamed structures will return to their normal condition. For instance, when a pin is inserted into the hand, it causes pain, swelling, heat, and redness; but if the pin or irritant be removed in time, and suitable treatment adopted, the parts resume their natural healthy condition, and any exudation that may have taken place is absorbed. This termination may take place suddenly or gradually.

25. **Exudation and Adhesion.**—By exudation is meant the cozing out of certain matter, and adhesion is the force by which various bodies stick together. Reparative results are obtained by the organization of the exuded lymph, the formation of new blood-vessels, the absorption of the serous fluid, and the closing of wounds, by adhesion of the cut surfaces, etc.; but at times the result of

exudation and adhesion is most formidable, particularly when adhesive bands are formed in *serous cavities*, such as the *pleura*, joints, and the sheaths of tendons.

26. **Effusion**, or oozing of the serum of the blood into the areolar tissue, results in the formation of large serous swellings or watery tumours, with small pellets and fibrinous strings floating amongst it; for instance, the swelling that arises on a young horse's shoulder from a nip with a collar, or those on the front of a cow's knees, which at times become very large, are due to bruises and effusion.

27. **Suppuration** is the formation of a yellowish-creamy matter or pus, which is of two parts, solid or corpuscular, and watery. Suppuration is both acute and chronic, and can go on in different parts of the body, forming what are called abscesses (gatherings). A good example is seen in strangles in young horses. At first the abscesses are hard and unyielding, but, as they ripen, or come forward, they begin to soften and point in the middle, always aiming towards the external surface, and having a well-defined marginal ring. Some burst of themselves, others require to be opened, but this should never be done unless the parts fluctuate well under the fingers, and in such cases the opening should always be at the bottom. We also have *diffused* and *superficial* suppuration; the latter being seen on mucous surfaces, such as the bronchial tubes, nostrils, and generative organs.

28. **Pus** is of various kinds — viz., (1) *laudable*, (2) *putrid*, (3) *sanious*, (4) *scrofulous*, and (5) *specific*. Of these different kinds of matter—or *pus*—**laudable** is looked upon as the most healthy; it is thick, or creamy. **Specific** resembles it in colour and thickness, but is most dangerous, as in the case of glanders. The others have their peculiar characters, and need the eye and attention of the professional man to deal with them.

29. **Ulceration** may be looked upon as perverted assimilation and degeneration of the atomic structures of a part, exposing a mattery-looking sore, and is another effect of inflammation generally found in parts of low organization, short of vitality. A good example is the front of the shin bone of an aged human subject. When



ulceration of this part sets in, it seldom, or never, heals. There seems to be a dissolution, or death of the minute structures, which the natural body has not tone enough to reproduce.

30. **Ulcers** are of various kinds; viz., *healthy, inflamed, indolent, weak, sloughing, and specific*. They are not very common in domestic animals, though cattle and sheep occasionally suffer from them, as the ulcers seen on the face in *Stomatitis pustulosa*, and in foot and mouth disease. Owing to the great difference in the nature of the various ulcers, their treatment should be under the eye of the professional practitioner. Stimulating applications are required for dressing the sores, while a generous, easily digestible diet is necessary, with tonic and alterative medicine. Ulceration heals by granulations.

31. **Mortification, or Gangrene**, is the death of a part, and arises from a variety of causes, independently of being one of the results of inflammation, such as a loss of nerve power, the plugging of a bloodvessel, and the want of blood in the part, etc. We have both *moist* and *dry* gangrene. Gangrene is **moist** when the tissues undergo softening or liquefaction. It is **dry**, from obstruction of the circulation, when the parts contain little fluid; for example, **senile gangrene** in old people, affecting the big toe.

32. **Slough**, the throwing off of a dead or mortified part, which may be complete or partial. The tissues may be involved to a greater or lesser extent, when the morbid process is arrested and a line of demarcation is then formed between the living and dead structures; the dead portion sloughing off, as is seen in mares and cows when the passage has been damaged in difficult parturition; or the sloughing off of one or more quarters of the udder in mares, cows, and sheep from extensive inflammation of the mammary gland. When these occur, Nature should be left to herself as much as possible, and the strength of the patient maintained with good nutritious diet.

33. When an extensive injury has been done to any portion of the body, more particularly the thick muscular part of the hips and quarters—being torn and lacerated by some foreign body, such as a

cart or a gig shaft—the neighbouring tissues are so much damaged (the bloodvessels being destroyed and nerve fibres shattered) that the part is very liable to mortification, owing to the inflammation set up being generally so intense. Our object, and greatest endeavour, should be to keep the inflammation in check, and to give tone to the neighbouring parts, and to assist them to throw off the damaged and dead portions. The best treatment I have found is to plug or cover the external wound with antiseptic dressings, so as to exclude the air, combined with a continuous application of blankets, six or eight ply thick, wrung out of cold water every four or five hours, or when they become hot and dry, until a fine, thick, yellowish-white matter is seen coming from the wound, which generally takes place in from forty-eight to sixty hours. In my opinion, the cold water application seems to extract, and keep in check, the excessive heat usually present; in fact, a sort of endosmotic and exosmotic current is set up; the cold from the wet blanket passing into the part of the body, as it were, to which it is applied, the heat being extracted from the part to the blanket, which becomes hot; the action equalizing the temperature, and giving tone to the undamaged tissues, at the same time assisting Nature in her physiological efforts, and also the pathological action to throw off the damaged or dead portions. Hot applications, to be of any good, must be continuous. They are generally badly applied, and, in my opinion, relax the tissues, and favour the process of gangrene.

34. **Septicæmia**, the contamination of the blood with septic organisms generated in an external wound or injury, which pass into the blood-stream and induce blood-poisoning. When the part dies, and is not thrown off by sloughing, the surrounding tissues swell and have a bladder-like sound, as found in gangrene of the udder in cows and sheep; at times seen also in the latter stages of milk fever, in the hind quarters of a cow, and from an injury with an external wound, when it is accompanied with a dirty brownish, foetid, watery discharge. There are rigors and tremblings of the body; pulse small and quick; respiration hurried; cold, clammy patches of perspiration all over the body, with head hanging down. We may then rest assured that the case is hopeless, **septicæmia**, or

blood-poisoning, having set in. Owing to the extensive swelling, we are often tempted to scarify the distended parts by plunging in the lancet, thus admitting the air and hurrying on that process we wished most to avoid—viz., mortification, or death of the part, and also of the patient as well. All the formidable effects of blood-poisoning can, however, be induced by a very small punctured wound or scratch with a sharp instrument. **Pyæmia**, is another form of blood-poisoning, due to the micro-organisms, not only circulating in the blood, but deposited in various organs and tissues of the body, and the formation of abscesses or gatherings.

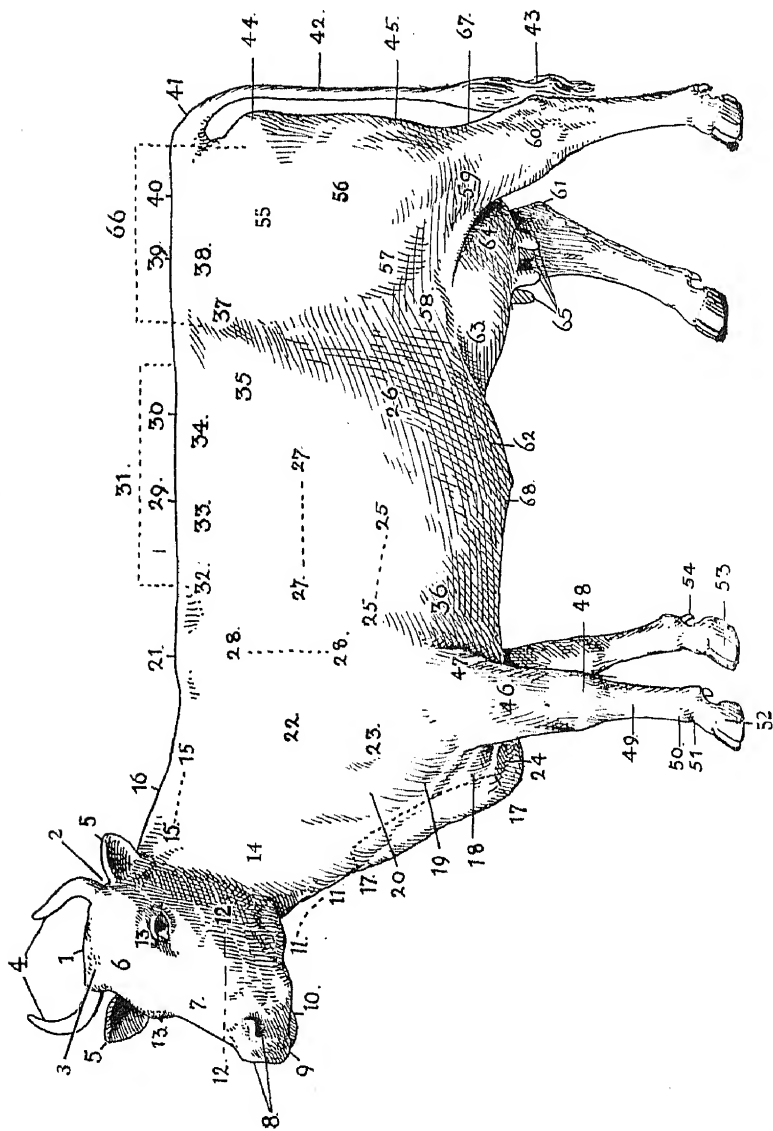
35. The **Causes of Inflammation** are various, and are termed *vital*, *chemical*, and *mechanical*. Vital causes may arise through some occult changes taking place within the body itself; chemical, from the application or use of strong acids, alkalies, etc.; mechanical, from blows, wounds, pressure, burns, etc., and inhalation of noxious gases and irritants. All the living tissues of the body are prone to the influence of inflammation; and whenever we have inflammation of any one organ or part of the body, it is always accompanied, more or less, by general or constitutional fever, which necessitates both *local* and *constitutional* treatment.

36. **Local Treatment** is the application of remedies, directly, to the affected parts, as by removing the shoes and putting on cold water bran poultices, in founder or inflammation of the feet. *Weed*, or inflammation of the absorbents or lymphatic vessels of the hind or fore leg, is another good case for local treatment, and no treatment is better than to wind meadow-hay bandages, saturated well with cold water, round the affected limb. Abscesses forming in any superficial part of the body is another illustration of the application of local treatment, which may be by hot or cold poultices, cooling lotions, salt and saltpetre dissolved in water, ice, sal ammoniac, vinegar and water, or stimulating liniments and blisters, and in a case of inflammation of the lungs, hot blankets applied to the sides.

37. **Constitutional Treatment** is the administration of internal remedies applicable to the case, and has to be adopted when there is a general disturbance set up—*sympathetic fever*.



PLATE III



## EXPLANATION OF PLATE III

### POINTS OF A COW

- |   |                              |
|---|------------------------------|
| 1. Head.                                  | 34. Back-Ribs.               |
| 2. Back of the Head.                      | 35. Upper Part of Flank.     |
| 3. Frontal Crest or Protuberance—<br>Poll | 36. Fore-Flank.              |
| 4. Horns.                                 | 37. Hip-Bone, Hooks.         |
| 5. Ears.                                  | 38. Haunches.                |
| 6. Forehead.                              | 39. Rump.                    |
| 7. Bridge of the Nose.                    | 40. Croup.                   |
| 8. Nostrils.                              | 41. Tail Head, Root of Tail. |
| 9. Mouth, with Upper and Lower<br>Lips.   | 42. Tail.                    |
| 10. Chin.                                 | 43. Tuft or Switch.          |
| 11. Throat.                               | 44. Pin-Bones.               |
| 12. Cheeks.                               | 45. Twist.                   |
| 13. Eyes and Eyelids.                     | 46. Fore-Arm.                |
| 14. Neck.                                 | 47. Elbow.                   |
| 15. Nape of Neck.                         | 48. Knee.                    |
| 16. Crest.                                | 49. Shin or Shank.           |
| 17. Dewlap.                               | 50. Fetlock-Joint.           |
| 18. Brisket.                              | 51. Pastern.                 |
| 19. Bosom.                                | 52. Coronet.                 |
| 20. Chest.                                | 53. Hoofs.                   |
| 21. Withers.                              | 54. Dew Claw.                |
| 22. Shoulder.                             | 55. Hip-Joint.               |
| 23. Shoulder-Point.                       | 56. Upper Thigh.             |
| 24. The Breast.                           | 57. Stifle-Joint.            |
| 25. Walls of the Chest.                   | 58. Flank.                   |
| 26. Belly.                                | 59. Lower Thigh.             |
| 27. Barrel or Side.                       | 60. Hock or Hough.           |
| 28. Crop.                                 | 61. Point of Hock.           |
| 29. Back.                                 | 62. Milk Vein.               |
| 30. Loin or Kidney Region.                | 63. Fore Udder.              |
| 31. Spine.                                | 64. Hind Udder.              |
| 32. Fore-Ribs.                            | 65. Teats.                   |
| 33. Mid-Ribs.                             | 66. Pelvic Arch.             |
|   | 67. Purse in Ox.             |
|   | 68. Sheath in Ox.            |

38. **Sympathetic Fever.**—When fever arises from some extensive injury or wound, it is known as *traumatic* or *sympathetic fever*. A few years ago the treatment of sympathetic fever in country practice generally took the form of blood-letting, purgatives, etc., which then seemed to give satisfaction, but now a more rational mode of treatment is adopted. The personal comfort of the patient is now looked after by putting the animal into a well-ventilated loose box, free from draughts, but with plenty of air; clothing the body and bandaging the legs, and administering medicines of a saline aperient character, such as 1 to 2 ounces of Epsom or Glauber's salts, 2 to 4 drachms each of nitrate of potash and cream of tartar, with 10 to 15 drops of Fleming's tincture of aconite, given either as a draught in one pint of cold water, or in the drinking water, two or three times a day, until the bowels respond, along with a suitable cooling diet. But detail will be more gone into when considering inflammation affecting the different organs and parts of the body.

39. Town practice is different to that in the country. For instance, 4 drachms of aloes would purge a town horse, whereas it would take 6 to 8 drachms to have the same effect on one in the country. The same thing holds good in pit horses, which have to be treated similarly to town horses. Half the dose required for horses in the North of Scotland is sufficient for those in the South of England. In all cases, whether horse or cow, it is of the greatest importance to have the bowels attended to (as there is no complaint, however slight, that does not affect the bowels more or less), but greater care is needed with horses, as they cannot stand strong purgatives like cattle.

40. **Simple Fever.**—General derangement of system, characterized by a rise of temperature, hurried breathing, quickened pulse, shivering, etc., and which may arise without any obvious cause. It may be brought about through changing from field to stable, change of food, drinking cold water when the animal is heated, standing in a draught, etc., and is generally ushered in by a shivering fit that is seldom seen; but, if observed, it is advisable to at once put on

plenty of clothing and give a good stimulant, say from  $\frac{1}{2}$  to 1 pint of whisky, with the same quantity of water, or a quart of hot ale and 1 ounce ginger or fever drench (*par. 1067, No. I.*), when resolution may be brought about and the animal ail nothing further. But, as generally happens, the shivering fit has not been seen, the first thing to be noticed is the patient hanging its head, breathing heavily and hurriedly, with nostrils distended, eye bright, and temperature increased to about  $104^{\circ}$  to  $106^{\circ}$ . Endeavour must then be made to find the cause and remove it. If this cannot be done, treat the symptoms thus: Place the animal in a roomy, well-aired loose box, clothe the body, bandage the legs, and give the saline medicine named under sympathetic fever. If not better or relieved in a few hours get other advice. Sometimes when the breathing is quick and the pulse is very full and strong, and the eyelid injected and red, the taking of 4 to 6 quarts of blood from the neck may relieve the animal so much that no further treatment will be needed, except giving nitre water and soft cooling food for a few days (this I have seen done in scores of cases), but the bleeding should only be done by a veterinary surgeon. The advantage of blood-letting is that it relieves the overloaded system quickly. To depend upon purgatives for this purpose, either for horses or cattle, would be loss of time, because it takes from twenty-four to thirty hours in the horse, and frequently longer in cattle, to act on the bowels, while it is very difficult to unload the system by perspiration; therefore, early blood-letting in many cases is advantageous, at least it is so in country practice. Bleeding in the past was *abused*; in the present, as a remedy, it needs to be *judiciously used*.

41. **Septic Fever** (*sapraemia*) is due to septic organisms gaining access to the system, as in **septicæmia** and **pyæmia**. Such cases are of a more formidable character than simple fever, and should at once be put under the care of a qualified practitioner, as the treatment is quite different to that of simple fever, requiring antiseptics and nourishing diet to keep up the strength. Quinine is useful, and can be given in from 1 to 3 drachm doses three or four times a day; hyposulphite of soda in 2-ounce doses, and chlorate of potash in 3-drachm doses, are also given alternately every six or eight hours,

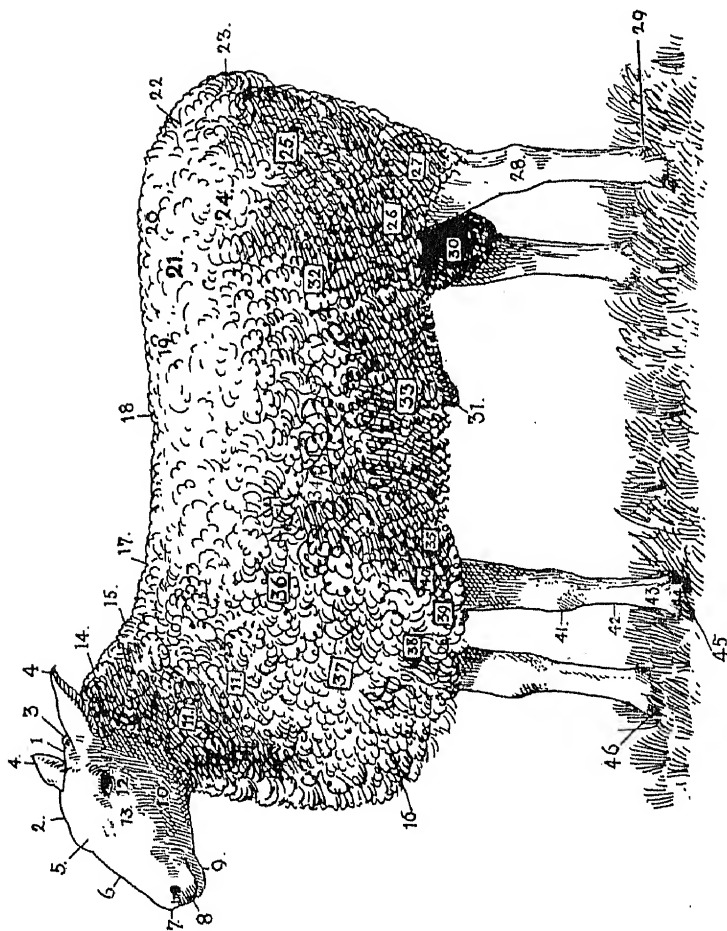


also suitable doses of veterinary solution of **nuclein** may be injected hypodermically, and repeated if necessary to increase the action of the phagocytes or blood scavengers (*pars.* 43, 422, 423, and 426), with nourishing gruels, linseed jellies, green food carrots, hay-tea, etc.

42. From these remarks it will be seen that from the various constitutions and the different forms of disease which are met with, and the great differences in their treatment, it is quite unsafe to start and tinker with them unless the nature of the complaint is thoroughly understood. My advice is this: In the first place, get a clinical thermometer, which can be had from 2s. to 10s. each; and, when an animal is ailing, take its temperature, by passing the thermometer into the rectum. If it rises to  $104^{\circ}$  or  $105^{\circ}$  (normal temperature of the horse being  $100^{\circ}$  to  $101^{\circ}$ ; cow,  $101^{\circ}$  to  $102^{\circ}$ ; sheep,  $103^{\circ}$  to  $104^{\circ}$ ), you should lose no time in calling in a qualified veterinary practitioner, as the case may be looked upon as tending to be serious. Don't think, because your neighbour had a horse or cow in just the same state—*apparently*—last week, and some wonderful patent nostrum cured it, that yours will be set all right with the same treatment. Your neighbour's animal may have had *one* or *two* of the symptoms similar to those exhibited in your case, but yours may have others accompanying these, which can only be detected by the professional eye. Don't waste time, money, and, perhaps, the animal as well, by delay in such a case, but send at once for your veterinary attendant, and, in the meantime, do as much to relieve the animal as possible, such as putting it in an airy box, clothing well, bandging the legs, etc. This of itself will often, both in the case of horses and cattle, set them right, and the temperature will come down  $2^{\circ}$  or  $3^{\circ}$  by simply putting them alone in a loose box. Animals, as a rule, when ailing in the fields, get away by themselves in a quiet corner. Follow their example; but whatever you do, do not start and tamper with quack medicines, of the composition of which you know nothing, and which may be exactly the reverse of what is required. Try and find out which way Nature is working, and then do what you can to assist her. If you fail in this, send for your professional veterinary adviser.



PLATE IV



## EXPLANATION OF PLATE IV

### THE POINTS OF THE SHEEP

- |  |                                     |
|--|-------------------------------------|
| 1. Back of the Head.                             | 24. Hip-Joint.                      |
| 2. Horny Protuberance.                           | 25. Upper Thigh.                    |
| 3. Horns.  | 26. Stifle-Joint.                   |
| 4. Ears.   | 27. Lower Thigh.                    |
| 5. Forehead.                                     | 28. Hock.                           |
| 6. Bridge of Nose.                               | 29. Heel.                           |
| 7. Nostrils.                                     | 30. Scrotum.                        |
| 8. Mouth, with Cleft Upper Lip<br>and Lower Lip. | 31. Point of Discharge from Sheath. |
| 9. Chin.   | 32. Flank.                          |
| 10. Cheeks.                                      | 33. Abdomen.                        |
| 11. Throat.                                      | 34. Walls of the Chest.             |
| 12. Eyes and Eyelids.                            | 35. Lower Breast.                   |
| 13. Lachrymal Pit.                               | 36. Shoulder.                       |
| 14. Nape of the Neck.                            | 37. Point of Shoulder.              |
| 15. Crest.                                       | 38. Fore Part of Breast.            |
| 16. Dewlap.                                      | 39. Fore-Arm.                       |
| 17. Withers.                                     | 40. Elbow.                          |
| 18. Back.  | 41. Front Knee.                     |
| 19. Loin or Kidney Region.                       | 42. Shin Bone.                      |
| 20. Rump.  | 43. Fetlock.                        |
| 21. Haunches.                                    | 44. Pastern.                        |
| 22. Croup.                                       | 45. Coronet.                        |
| 23. Tail.  | 46. Hoofs.                          |

43. Of late years a great change has taken place in the mode of treating derangement and diseases in farm stock generally, but more especially those maladies that are now considered due to the presence of pathogenic or disease-producing germs (bacteria and their products), which gain access to the body by the medium of the food, water, inhalation, and by inoculation through wounds, etc. Bacteriologists and highly-trained scientific workers have, and are now preparing, various serums and vaccines, which are injected hypodermically or otherwise into the body, and are said to act by generating an active immunity against the corresponding living disease-producing germs. The introduction of vaccine prepared from a certain kind of bacteria into the blood results in the production of certain anti-bacterial material, called by Sir A. E. Wright 'opsonins' (*opsono* = to prepare food for). By estimating the amount of opsonins in the blood we realize the amount of phagocytosis which is going on, or, in other words, the progress of immunization. Thus the natural immunity of the body can be materially aided by administering appropriate doses of suitable vaccines at various intervals. According to Wright, the natural remedy of any bacterial disease is brought about by a series of anti-inoculations and immunizing responses, the vaccine or inoculative matter being derived from the infected or diseased portions of the body, consisting of the bacteria or their products. Each successive immunizing response leaves the body defences more reliable, and finally complete immunity is produced. Sometimes, when the bacteria are poured forth in excessive numbers and their toxins are unusually virulent, the immunization fails, and the disease-producing germs multiply in the body. In such cases appropriate doses of vaccines injected at right intervals will stimulate the production of the protective material, and bring about a cure. (Of course, it must be borne in mind that appropriate and suitable vaccines must be used in each case. Thus the bacteria of disease have been combated by fortifying the resisting power of the white corpuscles of the blood (phagocytes), (*pars.* 422, 423, and 426), the stimulus used being preparations from other bacteria; but from experiments it has been found that disease-producing bacteria have been successfully resisted by chemical agents. It therefore becomes

possible to destroy the bacteria by drugs without injury to the patients, and thus the war against germic disease will be more successful than ever; hence medical agents are being specially prepared by several well-known drug firms, in fluid and tabloid forms, of standardized doses for the treatment of diseases, and are injected either under the skin (hypodermically), into the blood (intravenously), and into the windpipe (intra-trachially), and in many cases have good results. Yet, notwithstanding all this, it is, however, a well-known fact that in many instances Nature has within the body the wherewith—*vis medicatrix nature*—to repair and heal herself without the aid of medicine. And in respect of this I have, on many occasions, attributed beneficial changes to the simple action of common salt, owing to the patients licking the lump rock-salt placed before them, and therefrom obtaining a desire to take water and food when nothing else would induce them to do so. In all ailments, therefore, affecting horses and cattle, it will be found of great service to have a good-sized piece of lump rock-salt placed in the manger or trough for the animal to lick at leisure, particularly in febrile affections. In all cases of lameness, derangement, and disease in domestic animals, the following essentials are highly necessary: Perfect rest and quietness, proper ventilation, good bedding and sanitation, as well as drainage, and judicious feeding, and, above all, good nursing—conditions greatly needed but rarely met with in country veterinary practice.

## LECTURE II

### BONES

44. **Osteology**—the study of bones. Before entering, however, into the details of the diseases and accidents peculiar to the bones of domestic animals, I will first briefly run over the general skeleton.

45. **Bone** may be defined as a yellowish-white, hard, ordinarily insensitive substance, made up of two tissues, one of which is hard or *compact*, the other being porous or *cancellated*; while it is composed of one-third animal and two-thirds earthy matter, and is covered by a tough membrane called *periosteum*, and lined internally with a fine membrane called *endosteum*. Bone is the basis of the animal frame, or skeleton, giving attachment to the soft parts and shielding the delicate organs. For descriptive purposes bones are divided into three classes, as **long, flat, short** or **irregular**.

46. **Periosteum**—the outer covering of bone—is a dense fibro-vascular membrane consisting of two layers, an outer fibrous one and an inner one of fine connective tissue which is continued into the Haversian canals, by which means the bone is nourished. The **periosteum** varies in thickness according to the position of the bone, being thickest where the bone is most exposed to injury—for instance, on the **tibia** and **shank bone**.

47. **Endosteum** is a very fine vascular membrane lining the internal or medullary cavities of the bones, wherein the marrow (a fatty substance) is contained, and by its means the internal arteries are distributed through the internal parts of the bones. The

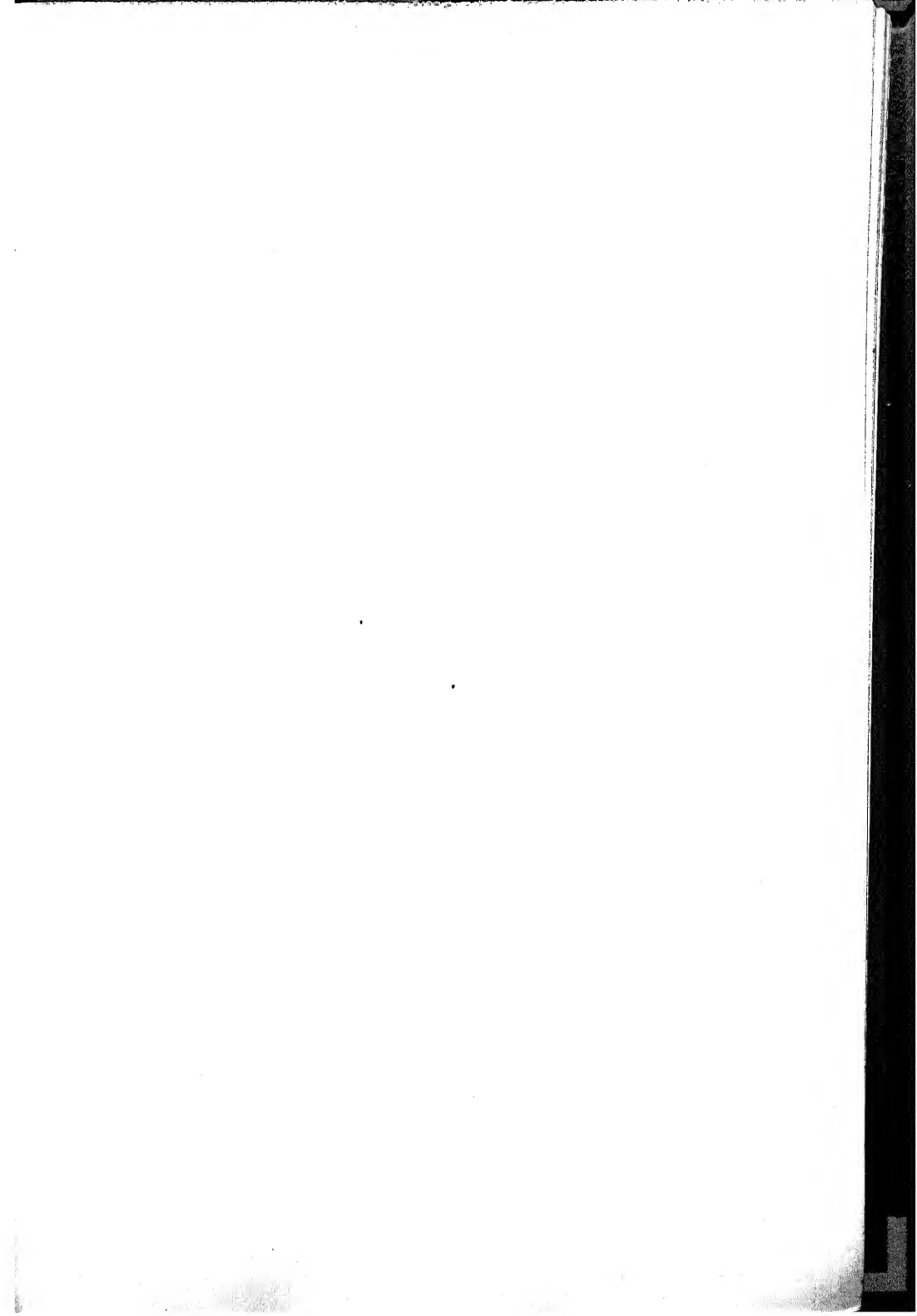
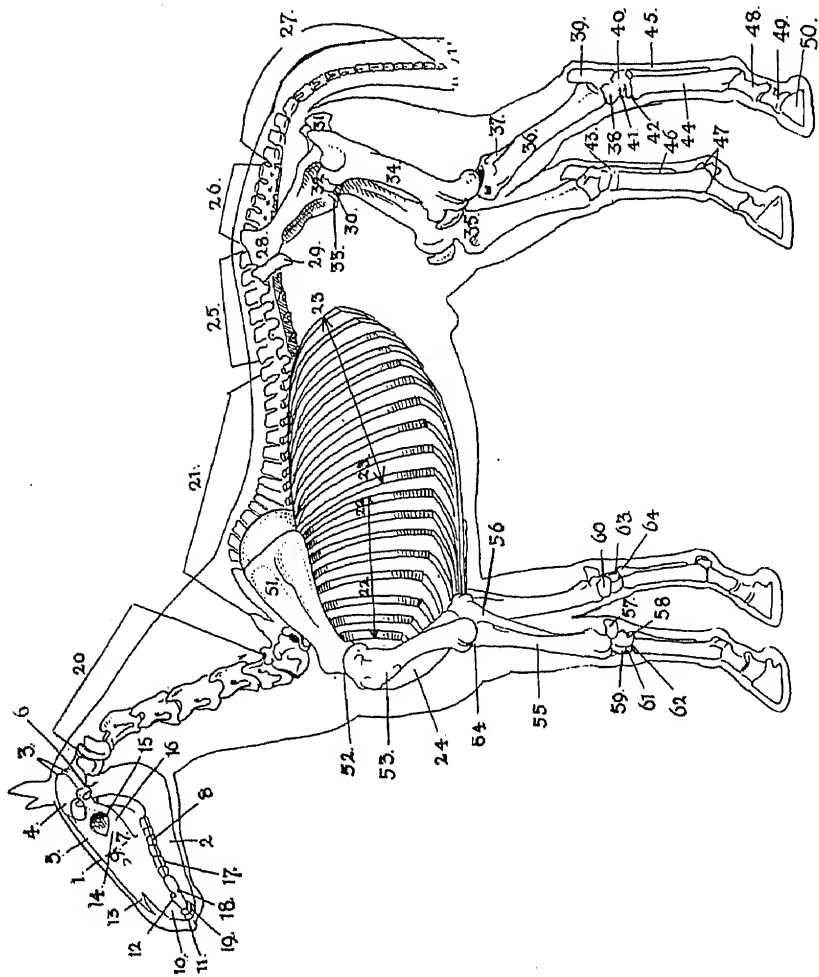




PLATE V



# EXPLANATION OF PLATE V

## THE SKELETON OF THE HORSE

- |  |  |                      |
|--|--|----------------------|
| 1. Upper Jaw.  | 34. Upper Thigh Bone, or Femur.                              |                      |
| 2. Lower or Under Jaw.   | 35. Stifle-Joint and Patella, or Knee Pan.                   |                      |
| 3. Occipital Bone.   | 36. Tibia, Large Lower Thigh Bone.                           |                      |
| 4. Parietal Bone.  | 37. Fibia, or Small Lower Thigh Bone.                        |                      |
| 5. Frontal Bone.   | 38. Astragalus.  | } Bones of the Hock. |
| 6. Temporal Bone.  | 39. Calcis, or Heel Bone.                                    |                      |
| 7. Superior Maxillary Bone.  | 40. Cuboid Bone.   |                      |
| 8. The Upper Molars.   | 41. Large Scaphoid Bone.                                     |                      |
| 9. Infra-Orbital Foramen.  | 42. Small Scaphoid Bone.                                     |                      |
| 10. Pre-Maxillary Bone.  | 43. Cuneiform Bone.  |                      |
| 11. The Upper Incisors.  | 44. The Shank, or Large Metatarsal Bone.                     |                      |
| 12. The Upper Canine Tooth or Tusk.  | 45. Outer or Splint Bone.                                    |                      |
| 13. Nasal Bone.  | 46. Inner Splint Bone.                                       |                      |
| 14. Lachrymal Bone.  | 47. Sesamoid Bones (2).                                      |                      |
| 15. Orbital Cavity.  | 48. Large Pastern Bone (Os Suffraginis).                     |                      |
| 16. Zygomatic Bone.  | 49. Small Pastern Bone (Os Corona).                          |                      |
| 17. Inferior Molars.   | 50. Coffin Bone (Os Pedis).                                  |                      |
| 18. Inferior Canine Tooth.   | 51. Shoulder-Blade.  |                      |
| 19. Inferior Incisors.   | 52. Shoulder-Joint.  |                      |
| 20. The Cervical Vertebræ (7), the first being the Atlas and the second the Dentata or Axis.   | 53. Humerus— Upper Arm Bone, articulates at the elbow-joint. |                      |
| 21. The Dorsal Vertebræ (18).  | 54. Elbow Joint.   |                      |
| 22. Eight True Ribs on the Breast Bone.  | 55. Fore-Arm, or Radius.                                     |                      |
| 23. Ten False Ribs.  | 56. Ulna.  |                      |
| 24. Breast Bone (Sternum).   | 57. Trapezium.   | } Bones of the Knee  |
| 25. Lumbar Vertebræ (6).   | 58. Cuneiform Bone.  |                      |
| 26. Sacrum, which consist of five vertebræ grown together, at the sides of which are four openings through which the sacral nerves pass. | 59. Lunar Bone.  |                      |
| 27. Coccygeal Vertebræ (20).   | 60. Unciform Bone.   |                      |
| 28. The Ilium.   | 61. Scaphoid Bone.   |                      |
| 29. The Haunch.  | 62. Os Magnum.   |                      |
| 30. Pubis.   | 63. Trapezoid Bone.  |                      |
| 31. Ischium.   | 64. Pea-shaped, or Pisiform.                                 |                      |
| 32. Hip-Joint.   |  |                      |
| 33. The Hip-Joint downwards.   |  |                      |

Bones below the Knee same as below the Hock, except the Shank Bone which is called Metacarpal.

2618

636

N13

endosteum (unlike the periosteum) cannot be detached as a continuous membrane. In most birds, however, the medullary cavities of the long bones contain air.

48. **Long Bones** are the weight-bearers, and are found in the extremities or legs, and have a shaft and two ends. The compact or hard structure exists on the outside, being **thickest** at the middle and inner side of the shaft, or wherever most weight falls, there covering the cancellated or porous and light portions. The latter structure is most abundant at the ends of the bone, so as to give a large yet light surface for joints, and it is there further covered by articular cartilage.

49. **Flat Bones** are found where important organs have to be shielded. Thus, the bones of the head encase the brain; the shoulder-blade and ribs protect the heart and lungs, liver, etc.; while the hip or pelvic bones cover the organs of generation. Flat bones are made up of two layers of compact tissue, with a layer of cancellated or porous tissue in the middle.

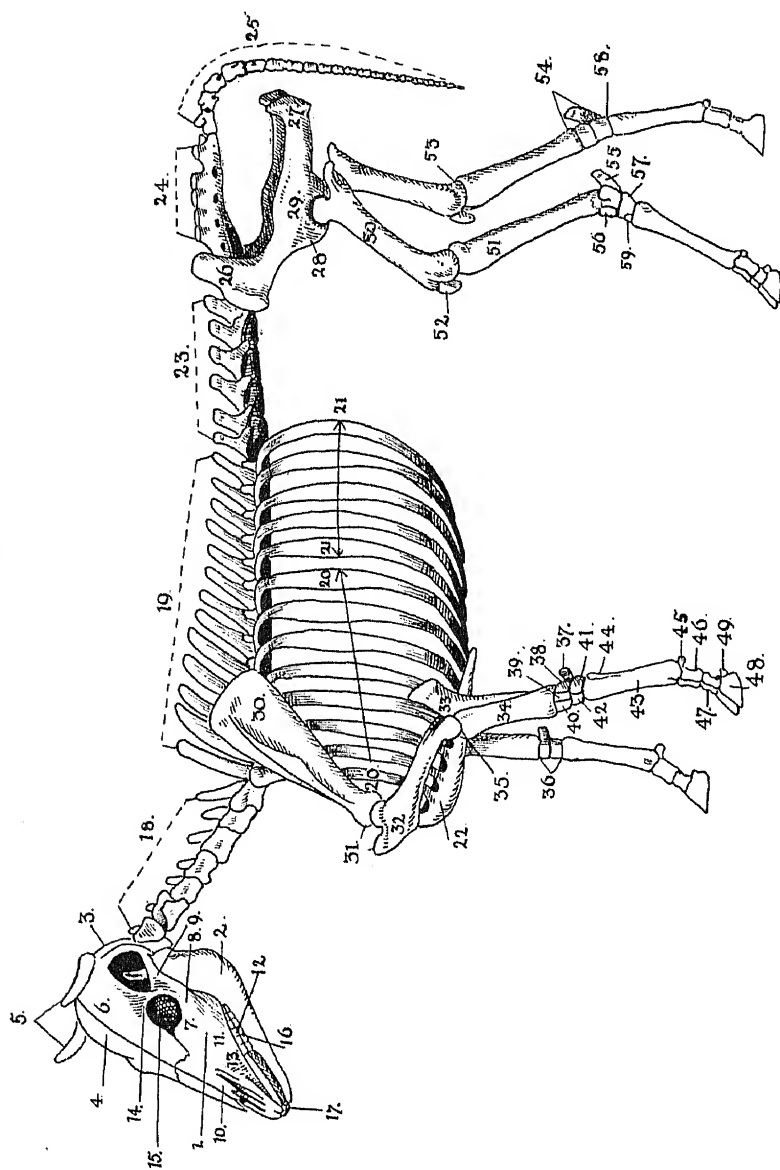
50. **Short and Irregular Bones** are found in the backbone or vertebral column, knee, hock, and lower portions of the limbs. These bones are principally composed of cancellated tissue, covered with a thin layer of the compact or hard structure, and are so arranged as to bear weight, yet allow of movement, more particularly of a gliding nature, and an 'open-and-shut' motion.

51. **The Skeleton** of the horse is said to be composed of about 253 bones (including the teeth), and is divided into **head, trunk, and extremities**. These divisions will, perhaps, be better understood by the following tables (*Plate V.*).

52. **The Head** is subdivided into **cranium** and **face**. The former consists of twenty separate bones, including four pairs and four small bones in each ear; while sixty-one bones are found in the face—nine pairs, three single, and forty teeth in the horse, and thirty-six in the mare.



# PLATE VI



## EXPLANATION OF PLATE VI

### THE SKELETON OF THE COW

- |  |   |
|--|---|
| 1. Upper Jaw.  | 30. Shoulder Bone.                              |
| 2. Lower or Under Jaw.   | 31. Point of Shoulder.                          |
| 3. Occipital Bone.   | 32. Upper Arm Bone.                             |
| 4. Frontal Protuberance.   | 33. Elbow Bone (Ulna).                          |
| 5. Horn Cores.   | 34. Forearm Bone, or Radius.                    |
| 6. Frontal Bone.   | 35. Elbow-Joint.                                |
| 7. Lachrymal Bone.   | 36. Fore Knee-Joint.                            |
| 8. Malar Bone.   | 37. Unciform Bone.                              |
| 9. Zygomatic Bone.   | 38. Polygonal Bone.                             |
| 10. Nasal Bone.  | 39. Lunar.                                      |
| 11. Great Maxillary Bone.  | 40. Scaphoid.                                   |
| 12. Six Upper Molars.  | 41. Semilunar Bone.                             |
| 13. Great Maxillary Bone.  | 42. Magnum.                                     |
| 14. Temporal Bone.   | 43. Metacarpal.                                 |
| 15. Orbital Cavity.  | 44. Rudimentary Metacarpal, or<br>Splint Bones. |
| 16. Six Lower Molars.  | 45. Sesamoid Bones                              |
| 17. Eight Incisors.  | 46. Pastern Bones.                              |
| 18. Seven Cervical Vertebrae, the<br>first bone being the Atlas. | 47. Coronet Bones.                              |
| 19. Thirteen Dorsal Vertebrae.                                   | 48. Hoof Bones.                                 |
| 20. Eight True Ribs.   | 49. Naicular Bones.                             |
| 21. Five False Ribs.   | 50. Thigh Bone (Femur).                         |
| 22. Sternum, or Breast Bone.                                     | 51. Tibia.                                      |
| 23. Six Lumbar Vertebrae.  | 52. Patella.                                    |
| 24. Sacrum.  | 53. Stifle-Joint.                               |
| 25. Eighteen to Twenty Coccygeal<br>Vertebrae.                   | 54. Hock.                                       |
| 26. Ilium.   | 55. Calcis (Heel Bone).                         |
| 27. Ischium.   | 56. Astragalus.                                 |
| 28. Os Pubis.  | 57. Scaphoid and Cuboid.                        |
| 29. Hip-Joint.   | 58. First Cuneiform Bone.                       |
|  | 59. The Second Cuneiform Bone.                  |

From the hock downwards the bones are the same as in the fore-limbs, except the Shank which is called Metatarsal.

## Bones of the Head.

### 53. Bones of the Cranium—

			Horse.	Ox.	Dog.	Pig.
Frontal (pair) ...	...	...	2	2	2	2
Parietal (pair) ...	...	...	2	2	2	2
Temporal (2 pairs, in horses only) ...	...	...	4	2	2	2
Occipital ...	...	...	1	1	1	1
Ethmoidal ...	...	...	1	1	1	1
Sphenoidal ...	...	...	1	1	1	1
Interparietal ...	...	...	1	1	1	0

### 54. Bones of the Ear—

Malleus	}	(4 pairs)	...	8	8	8	8
Incus							
Stapes							
Orbicular							

## 55. Bones of the Face—

Nasal	}	(9 pairs)	18	18	18	18		
Superior maxillary								
Pre-maxillary								
Malar								
Lachrymal								
Palatine								
Pterygoid								
Superior turbinated								
Inferior	„							
Vomer ...	...	...	...	1	1	1	1	
Lower jaw	...	...	...	1	1	1	1	
Teeth ...	...	...	...	40	32	42	44	
Os hyoides	}	bones of the	tongue	...	1	1	1	1
(7 or more sections)								

In the pig there is an additional single bone—the os rostri, or snout bone.

56. The Trunk is also divided into spine, thorax, and pelvis.

### Bones of the Trunk.

	Horse.	Ox.	Dog.	Pig.
Cervical (neck) ...	7	7	7	7
Dorsal (back) ...	18	13	13	14
Lumbar (loins) ...	6	6	7	7
Sacrum (croup) ...	5	5	3	4
Coccyx (tail) ...	13 to 18	20	20	18 to 22
Ribs (pairs) ...	{ 8 true 10 false	{ 8 true 5 false	{ 9 true 4 false	{ 7 true 7 false

57. The Sternum, or breast-bone, is in seven sections, and in the horse is placed edgeway up, while that of the cow lies flat.

58. The Sacrum in the horse, ox, and sheep is composed of five segments each; in the dog, three; and in the pig, four. The tail-bones are variable in different animals.

59. The Ribs of the ox are straighter, broader, and more uniform than those of the horse; they expand at their lower end, and the true ribs (excepting the first) articulate with their cartilages by true joints. The ox has also a small bone (sometimes two) in the heart, and the dog has one in the penis.

### Bones of the Extremities.

60. Bones of the Fore-Legs (Right and Left)—

	Horse.	Ox.	Dog.	Pig.
Scapula (shoulder-blade) ...	2	2	2	2
Humerus (upper arm) ...	2	2	2	2
Radius (forearm) ...	2	2	2	2



Bones of the Fore-Legs (Right and Left)—*continued*.

		Horse.	Ox.	Dog.	Pig.
Ulna (elbow-bone)	$\left. \begin{array}{l} \text{much} \\ \text{larger in} \\ \text{the ox than} \\ \text{the horse} \end{array} \right\}$	2	2	2	2
Carpus (knee)	...	8 pairs	6 pairs	7 pairs	8 pairs
Upper Row—					
Scaphoid, lunar,					
cuneiform, pisiform					
Lower row—					
Trapezium, trapezoid, magnum, unciform					
					(In the ox the trapezium is wanting, and the magnum and trapezoid are represented by a single bone.)
Metacarpal ...	...	2 large	2 large		
„ ...	...	4 small	2 small		
Sesamoids ...	...	4	8		
Os suffraginis (large pastern) ...	...	2	4		
Os coronæ (small ditto) ...	...	2	4		
Os pedis (coffin bone)		2	4		
Os navicular (shuttle ditto) ...	...	2	4		

*See par. 61.*

61. The arrangement of the bones under the knee of the dog resembles that of the human hand. They number thirty-four in each limb, whilst those under the knee of the pig are about twenty-eight in each.

62. **Os Innominatum**, or pelvic (hip) bone, is composed of three sections—**ilium**, **ischium**, and **pubis** (right and left)—and these form the side, floor, and part of the roof of the pelvic cavity.

## 63. Bones of the Hind-Legs (Right and Left)—

			Horse.	Ox.
Femur (thigh bone)	...	...	2	2
Patella (stifle)	...	...	2	2
Tibia (leg)	...	...	2	2
Fibula (leg)	...	...	2	—
Tarsus (hock)	...	...	6 pairs	5 pairs
Astragalus, calcis, cuboid, sca- phoid, and two cuneiforms. }				
Large metatarsal	...	...	2	2
Small „	...	...	4	2

64. The pastern bones correspond with those of the fore extremities both in name and number. The bones above the hock are the same in the pig and dog; the hock, however, consists of seven pairs of bones in these animals, while each have twenty-nine pairs of bones under the hock. The skeleton of the **sheep** is analogous to that of the ox, both in number and names of bones (*Plate VI.*).

65. **Arthrology**, or study of the joints. The various bones of the body are held together by means of dense fibrous structures, called **ligaments**, to form **joints**, which are of three classes. In descriptive anatomy these are again subdivided, but the three primary classes only will be dealt with—viz.: **synarthrosis**—immovable, such as the union of the bones in the head; **amphiarthrosis**—slightly movable, as between the bones of the vertebræ; **diarthrosis**—movable in any direction, as in the hip, shoulder, knee, etc.

66. **Ligaments** are dense, fibrous, amber-coloured, flexible bands and capsular envelopes connecting ends of bones to form articulations, and are composed mainly of **white fibrous tissue**. Some ligaments, however, are mostly of **yellow elastic tissue**. The **ligamentum nuchæ**, which supports the head and neck, is V-shaped, and extends from the top of the shoulder, or withers, to the crown of the head, and consists of two layers or plates. Ligaments which hold the ends of bones together are termed capsular

and binding. The **capsular** ligaments are fibro-membranous bags or sacks, which envelop both ends of the bones, and are lined by a fine **synovial** membrane, which secretes the **synovia**, or **joint oil**, by which the articulation is lubricated. The **binding** ligaments are flattened or rounded bands running from the lower end of one bone to the top of the succeeding bone, and when present at the sides of the joint are called **lateral** ligaments; but when found between the ends of the bones in the joint they are called **interosseous**, and when they bind down tendons passing over the joints are named **annular** ligaments.

67. **Cartilage**, or gristle, is a pale bluish-white, firm, elastic, glistening substance, which is found adhering to the surface of bones, and forming parts of the skeleton, and is of two kinds—**temporary** and **permanent**. The **temporary** cartilage forms the original basis of bone, which in adult life becomes ossified. **Permanent** cartilage consists of two varieties—viz., **hyaline cartilage** and **fibro-cartilage**. And these again are named according to the purpose they serve, such as **articular**, when at the ends of bones to form joints; or **interarticular**, when it forms a pad in the middle of a joint, as between the bones of the vertebræ and in the stifle. We also have the **costal** cartilages, prolonging ribs anteriorly; the **cariniform** cartilage, keel-shaped, at the front of the sternum; the **ensiform** cartilage, heart-shaped, at the posterior end of the sternum; and the cartilage of **prolongation**, attached to the top of the scapula. **Lateral** cartilages are found on each side of the foot; and various cartilages form the basis of the **ear**, **larynx**, and **wind-pipe**. In short, cartilage is found giving shape and form where bone would not answer. Now, all these structures are liable to disease and injury, as well as the soft parts of the body.

68. **Bones** are subject to inflammation, more particularly so those of young animals, before they are matured. **Healthy bone** is **non-sensitive**, or very slightly so; but when bone is under inflammation, then, owing to its unyielding nature, the pain is very acute.

69. **Periostitis** is inflammation of the covering of the bone, and mostly occurs in young race-horses as **sore shins**. When the

inflammation is very acute and continuous, great constitutional disturbance is set up, the parts affected become swollen and very painful to the touch, and if not speedily relieved the disease may terminate in death of the bone (necrosis) or the death of the patient. Although *periostitis* is generally the result of some injury done to the bone or its covering (*periosteum*), it may also arise from constitutional disturbance, such as rheumatism (*rheumatoid periostitis*), causing acute pain to the animal, accompanied by a great loss of flesh.

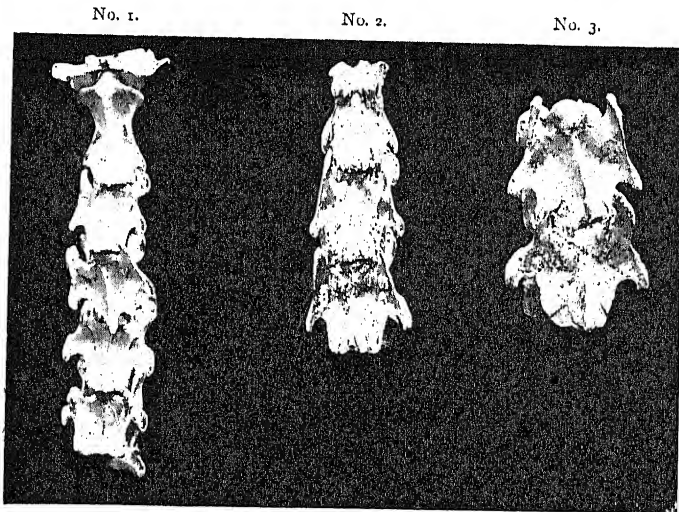


FIG. 1.

The photo shows—No. 1, healthy bones of the neck (*cervical vertebrae*); Nos. 2 and 3, caries or ulceration of the periosteum of the same bones, with ankylosis, or the growing together of the joints.

70. **Treatment.**—Rest is the first essential. Some practitioners recommend the use of hot fomentations, or bandages wrung out of hot water. For my part, I like cold-water applications best, or *spongiopiline*, soaked in cold water, and secured over the affected part with a bandage. For combating the fever, I find saline fever medicines answer best (*par. 1067, No. II.*). Sometimes the parts affected have to be cut down upon to liberate the exudate under

the periosteum. At times a good plaster bandage has a grand effect.

71. **Ostitis** is inflammation of the bone, and may be due to an injury, or may arise from constitutional or hereditary causes—tubercular or scrofulous, or from other diseases, such as attacks of rheumatism. Sometimes a very slight injury may set up inflammation of the bone, and cause bony material or exudate to be thrown out, forming bony enlargements, such as **splint**, **ringbone**, and **spavin**. These deposits are known as **exostosis** or **osteoma**, and our endeavour should be to find out the exact place affected, and apply such remedies as will hurry on the inflammation to resolution and consolidation, and thus form a true bony deposit. For treatment, nothing beats the application of cold water. When there is no water-main, such as is found in most towns, this treatment can be accomplished by elevating a large cask or tub filled with water, and connecting with it one end of a piece of  $\frac{1}{4}$ -inch indiarubber piping, 10 or 12 or more feet long, the other end of which is secured over the parts affected or to the horse's limb by a bandage or other appliance, and when this is fastened to the part requiring irrigation, it secures a constant stream of water on the syphon principle—**tub** and **tube** irrigation. When the inflammation has abated, a smart blister may be applied, or, where applicable, the plaster bandage may be used.

72. **Caries** or **Ulceration** of the bone is a molecular death of a portion of the bony structure, which has a worm-eaten appearance. There is no bone in the body that is not subject to this affliction, but it affects some bones more commonly than others. The pain is continuous, and wears the animal down. The strength must be supported with good nutritious diet, while cold applications should at first be resorted to, followed by blisters, firing, punching, and, when practicable, cutting down on the part and scraping with a bone spoon, thus endeavouring to bring about healthy action. These latter operations should be in the hands of a professional man. If the disease is near to or in connexion with a joint, the object should be, if the animal is likely to be of any service afterwards, to hasten

on the inflammatory process to throw out healthy bony material sufficient to unite the ends of the bones and form a stiff joint.

73. **Anchylosis**, the abnormal consolidation and immobility of a joint. In this case the articular cartilage becomes absorbed or destroyed, and a bony deposit takes its place in and around the damaged joint, the two bones becoming united. Sometimes the disease continues, and breaks out, forming **sinuses**, which discharge a foetid, irritative matter, and are extremely difficult to deal with, requiring an operation and antiseptic treatment. Generous diet is highly necessary. Old horses are very subject to anchylosis from hard work or rheumatic affection, particularly in the back bones. Great care is therefore necessary in casting these. The knee, hock, fetlock, and pastern joints also on many occasions become fixed, and the flexibility of the limb is interfered with; but slow work, particularly that on the farm, can be done without pain to the animal, although what may be called mechanical lameness might be present. Anchylosis may, however, arise from other causes, and the joint become fixed.

74. **Necrosis**, or death of the bone, resembles mortification in the soft structures. When inflammation of bone is very intense, it may at times terminate in death of the affected part. The hard or compact structure is said to suffer most from necrosis, and when the dead bone is encased in the healthy structure it acts as an irritant, and causes a foetid discharge. I have seen it in the lower jaw, incited by the rough usage of the horse-breaker, where the dead portion, as soon as it became loose enough, was removed, and the part healed. I have removed half of the navicular bone and wing of the coffin bone, also a portion of the shank (metatarsal) bone with success. Immediately the dead portion is removed the discharge ceases, and the place soon heals up. It must be dressed with antiseptics (and nothing is better than a weak solution of hydrochloric acid) and interfered with as little as possible, in order to let it mend. At times the dead portion cannot be got at to remove, and it then becomes sequestered by healthy bony matter being thrown out, and enveloping the dead portion; but this is a long process.

75. **Rickets** is a peculiar softening and yielding condition of the bone, and may be looked upon as arising from the imperfect assimilation of the lime elements through a want of earthy salts, or an excess of animal matter, by the bony structure, so that the bones will scarcely support the weight of the body. Rickets is mostly seen in young dogs and pigs, and not so frequently in foals and calves. In the treatment of rickets the affected animal should be put into a well-drained and ventilated box, and provided with a good comfortable bed. Should any constitutional disturbance be present, it ought to be combated by giving fever medicines, followed up with tonics; and, as such, nothing is better than the **syrup of phosphates of iron, potash, soda, and lime**, and glycerine or cod-liver oil, given in doses of 1 tablespoonful twice a day in milk. Good, well-boiled oatmeal porridge with plenty of milk and a wine-glassful of lime-water night and morning is also recommended.

76. **Mollities Ossium (osteo-malacia)** is real softening of the bone, which becomes of a spongy red texture; the treatment is much the same as for rickets. Another disease of the bone, which is thoroughly described in Williams' 'Principles and Practice of Veterinary Surgery,' is called **osteo-porosis**, and is a remarkable softening and swelling of the bony structure. I have not, however, in all my practice come across such a case.

77. **Fragilitas Ossium**, or brittleness of the bone, is mostly seen in aged animals; as they advance in life the bones become firmer, and lose their animal matter to a certain extent—so much so that the bones of an old horse, owing to their fragile condition, are very subject to fracture.

78. **Osteo-Sarcoma** is a malignant disease of the bone of a cancerous nature, which at times implicates the flesh as well. It is very common in finely-bred cattle and horses, attacking generally the head, and frequently commencing in the inner corner of the eye; the ribs are also the seat of the disease. It creeps on very insidiously, producing little or no constitutional disturbance. The animal seems to have no pain, but gradually loses flesh. I have seen cases where the whole side of the upper jaw, including the eye-socket and upper

molar teeth, was so affected that I have removed the latter with my fingers and scraped off the diseased growth ; yet, although the bleeding was excessive, the animal seemed to feel no pain. I have also seen the under jaw in a similar condition to that of the upper. The first appearance of the disease is a large swelling, which finally breaks out with a dirty brown discharge and a rapid growth of spongy-looking flesh. As little or no good can be done the animal had better be destroyed. This disease may be, and often is, mistaken for actinomycosis, which it very much resembles.

79. **Scrofulous or Tubercular** disease of the bone is due to the deposition of tubercular material in various parts of the bony structure. A number of cases in cows have come under my notice where the tubercular deposit has been found in various parts of the spine, causing a peculiar staggering gait, and the animal finally loses the power of the hind-legs even when the tubercle has been found in the neck bones. It follows certain strains of blood ; the animal suffering will continue to live on, feed, and chew the cud, but finally it gets so bad that it cannot get up, and has to be rolled from side to side every five or six hours. The stifle, knee, and other joints suffer very much from this disease, treatment as a rule being of little use. The best remedy I have found is the injection of a dose of tuberculin under the skin at the breast once a month ; this has at times a beneficial action, and arrests the progress of the disease.

80. **Enchondroma** is a cartilaginous growth or tumour upon a bone, such as the sternum and ribs, seldom causing, however, any constitutional disturbance ; when practicable this has to be removed by a surgical operation:

81. **Fractures**.—What is a fracture? Some define it as a solution of continuity, which, I think, is not a good description. My definition of a fracture is : ‘ A forcible separation of the cohesive particles of a hard substance into two or more parts.’ Now, the bones of an animal are as liable to fracture as those of the human subject. Formerly it was thought that the bones of a horse would not mend ; yet this is not so, for they will unite more quickly than those of the human frame, but we cannot place the patient in the



same state of rest and quietness, hence the difficulty in getting recoveries. With flat bones, as the shoulder-blade and pelvic bones, where they are enveloped with flesh, the ends of the bones are kept fairly well in apposition, and at times do capitally, simply by putting the animal on to the slings, with perfect quietness, and with a good pitch charge applied over the affected parts. The bones of the pastern joints, when the injury is not too extensive, also occasionally do well, and where the animal is likely to be useful for stud purposes it is worth the attempt. The best recoveries in fractures of the lower bones of the limbs are obtained by putting on a good starch or plaster-of-Paris bandage—the latter is preferable—and turning the patient out to grass. It is astonishing, when the animal is left to itself, how soon it can nurse the maimed limb. Fractures of the long bones or weight-carriers, such as the thigh, forearm, and shank, are the most difficult to deal with, especially in the horse, which, if so injured, is generally destroyed; yet in the human being these are the best to treat. The long bones of cattle and dogs unite readily by putting on with melted burgundy pitch thick shoe-sole leather splints,  $1\frac{1}{2}$  inches broad, all being held with a bandage, which is not too tight, so as to allow of the swelling which takes place. When a bone is fractured, we sometimes have much constitutional disturbance or **traumatic fever** set up, and this has to be treated as well as the injured part (*par. 38*). Great care and judgment are required in putting splints and bandages on a broken limb. Splints made of stout shoe-sole leather are very useful, placed so as to leave room between the splints for the limb to swell and for the passage of the blood. A little melted burgundy pitch put on the splint before placing it on the limb keeps it in its place. The bandages as they are rolled on are smeared with the melted pitch, and must not be pulled too tight, especially in young foals.

82. **Callus**, a deposition of bony material. Before a fracture can unite, inflammation has to take place, and reparative material or bony exudate is thrown out between and around the broken ends of the bone, taking about six or eight weeks to become consolidated, and which on solidifying is called the callus. A great many weeks are required before the muscles of the affected limb regain their

action. Sometimes, instead of the ends of the bones uniting, they become covered with cartilage, and form what is termed a false joint; when this is the case it is best to have the animal destroyed.

83. **Fractures** are of six kinds, viz.:

- |                                |                        |
|--------------------------------|------------------------|
| 1. <b>Simple.</b>              | 4. <b>Complicated.</b> |
| 2. <b>Compound.</b>            | 5. <b>Green Stick.</b> |
| 3. <b>Compound Comminuted.</b> | 6. <b>Impacted.</b>    |

84. **Simple Fracture** is when the bone is simply broken without much injury to the flesh—a fracture only into two parts, and without any external wound.

85. **Compound Fracture** is where the bone has been broken in an oblique manner, and the sharp ends, pointing up and down, cut through the flesh and skin, and make an external wound. In the horse this is difficult to deal with, and the most humane course is to have the animal destroyed.

86. **Compound Comminuted Fracture** is where the bone is broken or crushed into a great many pieces and the connecting tissues implicated. Little or no good can be done in these cases.

87. **Complicated Fractures** are where the fracture extends into a joint, or wounds important organs, bloodvessels, etc.

88. **Green Stick Fracture** is a partial or deferred fracture, where only part of the bone is partially broken (cracked). It is an incomplete fracture, in which one portion is broken, while the other holds together.

89. **Impacted Fracture** is the jamming or driving in of one fragment of bone into the other, without movement or crepitation.

90. All the bones of the body are subject to fractures. When we had the old horse-thrashing machines, injuries to the **bones** of the **head** were not uncommon. In pit horses, too, I have seen the frontal and nasal bones delved in, and occasionally had to use the trephine to remove a piece of bone so as to get into the cavities and liberate the collected blood or effusion. The lower jaw also some-

times gets broken; but all such cases require the attention of the qualified practitioner.

91. **Occipital Bone**, at the back part of the head, is often fractured by the horse falling back, and so is the **atlas**, or first cervical vertebra. The injuries are generally followed by paralysis, and the animal has to be destroyed.

92. **Cervical Vertebrae**.—The oblique processes of these bones are now and again fractured, mainly by the horse getting a hind-foot shoe fixed in the head-collar on scratching its head. When this takes place, the head turns round to one side, the nose nearly touching the knee, and there is all the appearance of some of the neck bones being dislocated. The head, when this occurs, should be tied up short to the rack with a double-shanked halter, and the part, supported by a stout pitch plaster, with wooden splints, and cradle, put round the neck. The bones of the neck also occasionally get smashed by the horse falling on its head. One case in particular deserves mention: Lord of the Harem, when racing at Harras Moor, Whitehaven, some years ago, fell and broke the third and fourth neck bones. After falling, strange to say, *it got up and walked a quarter of a mile to a loose-box*; but immediately it got inside it laid down, and never got up again. I saw it next day, in company with two other professional men, when we ordered it to be destroyed, as there was no mistake about its neck being broken. Greyhounds also frequently come to grief in this fashion when coursing.

93. **Broken Back**.—When this happens, the animal may rise on to its fore-legs, but cannot get the hind ones up. To test it, stick a pin into the hind limbs, and if it shows pain and can pull its legs up to its belly, or kick out, there is some chance for the patient; but if no pain is evinced the case is hopeless.

94. **Haunch Hook**, or hip-bone, is frequently broken or chipped, and should be noticed particularly, specially when examining for soundness. It may be caused by the horse tumbling down or by going through a doorway, but it does not hinder the horse from doing its work. The piece broken off may drop into the flesh below,

but very rarely it brings on bad effects. Sometimes, however, it forms an abscess, which has to be cut down upon, and the piece or pieces of detached bone removed. This lesion is of more frequent occurrence in cattle than in horses.

95. **Ilium.**—When the shaft of this bone is broken, the horse has a peculiar way of walking; on putting one hand on the point of the haunch and the other on the rump bone, and getting some one to stir the leg, you will both hear and feel the ends of the bones crunching underneath. Long rest and support with pitch charges are required.

96. **Pelvic Bones.**—I have seen the floor (**symphysis pubis**) of the pelvic cavity fractured by a fall down a stone quarry, and when the animal (a cow) attempted to stand the legs spread apart. It was put in slings, had its hocks buckled together, and made a good recovery in about seven or eight weeks. Horses should also be put into slings, and have the legs tied together at the hocks. When such an accident happens to a fat cow or ox, it should be sent to the butcher.

97. **Ischium**, or rump bone, is now and again fractured in the horse. This may be caused by the animal falling over backwards, and occurs more particularly in a young horse, when first tied up, breaking its halter and rearing, or from a slip when backing. It is not of much consequence; only the side injured is more flattened than the undamaged one. This should be carefully noticed in examination for soundness. It is best seen by viewing the animal sideways.

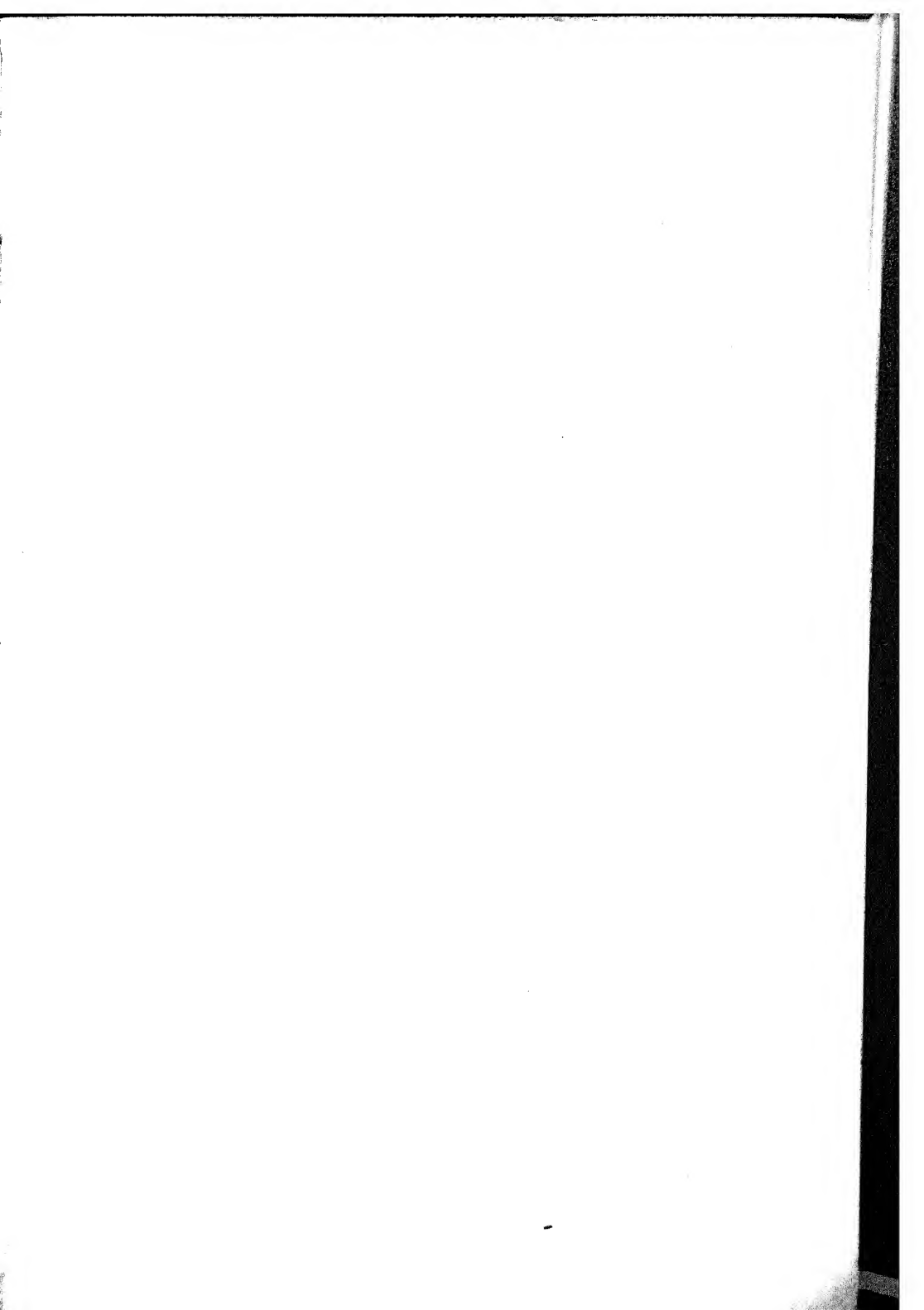
98. **Femur** is at times fractured at the top or neck, and also in the shaft. It may be due to a fall, or it may occur when a horse has been cast and tied for some operation, as in castrating. On account of the quantity of flesh surrounding the bone, little or nothing can be done; the animal has to be destroyed. I remember one case—a valuable carriage horse—where the inner condyle of the lower articulation of the femur was broken off, and the **patella**, or cap of the stifle, was split at the same time; it was a compound comminuted fracture. The horse was put into slings, but its sufferings were so great that it was shot.

99. **Tibia**, or leg-bone, is considered to be more liable to fracture than any other bone in the body, but very often the bone is merely cracked without any displacement, and with little or no lameness present. A slight skin wound may perhaps be seen, or, maybe, only a small enlargement felt, which is painful to the touch.

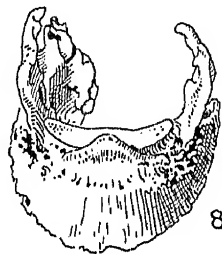
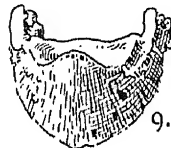
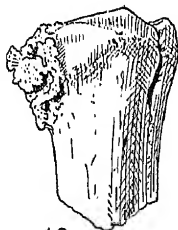
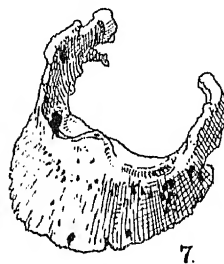
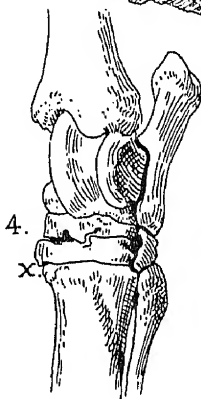
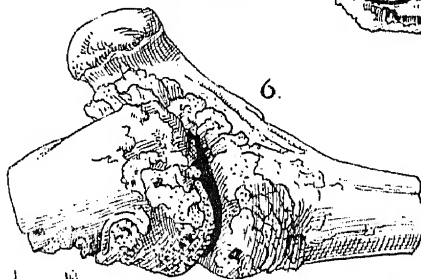
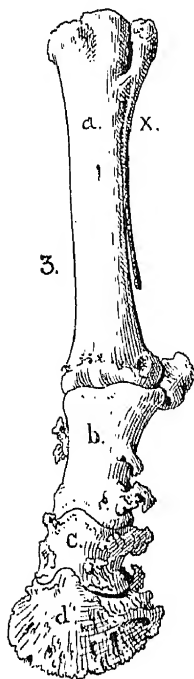
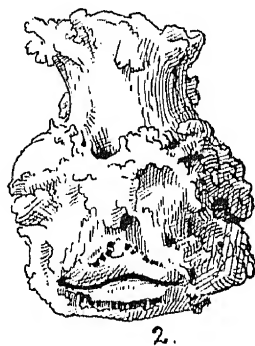
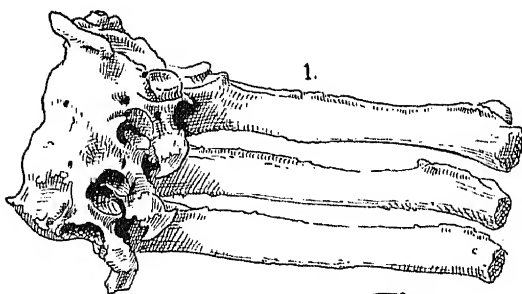
100. **Cracked Tibia**, or deferred fracture, mostly occurs when two horses are put into one stall, and one of them, standing a little further forward than the other, kicks out and hits its companion on the inside of the thigh. The best thing that can be done in a case of this kind is to at once tie the injured horse up by the head with two halters, one on each side, and put on the slings, not permitting it to lie down, as the limb frequently gives way when the animal gets up. But if it is kept working for two or three days (which it may be equal to), the least exertion will cause the bone to part asunder. Hence, if there is a doubt whether the horse's leg be cracked or not, give the animal the benefit of the doubt, and tie it up for a time. In one case under my notice the horse stood for three weeks, but when turned out to grass it laid down to roll, and on rising broke the bone in two. In the case of a blow on the inside of the fore-leg—the **radius**—there is the same danger, and similar treatment must be adopted.

101. **Scapula**, or **Shoulder-Blade**, may be broken by excessive muscular contraction, owing to the lower parts of the limb—particularly the foot—being suddenly injured. It may also be damaged by the animal falling, through making too sharp a turn when galloping. If the fracture be oblique, and the horse is put in slings, the parts being well supported with a good pitch charge, a good recovery may result; but if the neck of the bone be broken, and the joint be implicated, treatment is of little avail.

102. **Humerus** can be fractured by the animal falling in its gallop, or by a kick from another horse. Recovery entirely depends on the nature of the injury. Treatment is the same as for the shoulder-blade.



# PLATE VII



## EXPLANATION OF PLATE VII

### BONE DISEASES

1. Anchylosis of the Back Bone, showing Three Bones fused together.
2. Anchylosis of the Pastern Bone, with Caries and High Ring Bone.
3. Shank Bone (*a*), Long Pastern (*b*), and Short Pastern (*c*), and Coffin or Pedal Bone (*d*), showing Bony Deposits, with Ulceration; ( $\times$ ) Seat of Splint.
4. Left Hock-Joint. ( $\times$ ) Seat of Bone Spavin.
5. Occult Bone Spavin, showing Three Bones united together (the Two Cuneiform Bones and the Scaphoid), as a Result of Inflammation and Bony Deposit.
6. Ulceration or Caries of the Elbow-Joint of a Horse.
7. Coffin Bone, with Lateral Cartilage ossified and enlarged as Side Bones.
8. Bad Caries, Side Bones.
9. Normal Coffin or Pedal Bone.
10. Knee Spavin with Caries.
11. Sound Navicular Bone.
12. Navicular Bone: Dark Spots indicate Ulceration of Bone, as in Navicular Disease.



103. **Ulna.**—The upper and posterior portion of this bone forms the elbow, the point of which is occasionally fractured by a kick or from a fall. When this happens, the limb hangs down (dropped elbow) and the knee-joint bends forward as if all the muscles between the back of the shoulder-blade and the elbow-point were torn asunder, and recovery is very uncertain. Fracture of the first rib shows similar symptoms.

104. **Radius, or Forearm, and the Cannon or Shank Bones** of the fore and hind legs in the horse are most subject to fractures, and are very difficult to treat, owing to the limb having to hang pendulous. There is great pain, and the parts swell, generally ending with mortification of the soft structures and death of the patient. The most humane treatment, therefore, is to destroy the animal at the outset. These bones in cattle, sheep, and dogs, however, generally do well when splints and bandages, as already named, have been properly applied.

105. **Knee-Joint.**—Some of the small bones of this joint are at times fractured by the animal being kicked, or by its coming in contact with a stone wall, etc. Splints and bandages should be applied and long rest given, but the result is invariably a stiff joint.

106. **Sesamoids, or fulcrum bones, at the back of the fetlock,** are occasionally fractured; when this occurs the fetlock descends and the toe sticks up. The **os suffraginis**, or *large pastern bone*, in the fore-leg, seems generally to be the most subject to fracture, being at times broken into a number of pieces. The same thing occurs to the **os coronæ**, or *small pastern*. Such cases, when the bone is not too much smashed, make good recoveries when put under treatment, but leave behind stiff joints. The **os pedis**, or *coffin bone*, as well as the **navicular bone**, are also occasionally fractured. These fractures are generally caused by the horse galloping on a hard road, or on rough, uneven ground, or on hard sand. (For bones mentioned in *pars. 91 to 106* reference should be made to *Plates V., VI., and VII.*)

## SPECIAL DISEASES OF THE BONE.

107. **Splint** is a bony enlargement, and is usually found on the inside of the fore-leg, just below the knee, though occasionally seen on the outside, and also, but rarely, on the hind shanks. It is due to an injury or concussion, setting up inflammation of the bone and periosteum, and resulting in the throwing out of bony matter forming an **exostosis**, or bony tumour. Young horses of the light class are most subject to it, chiefly through their being put to too fast and

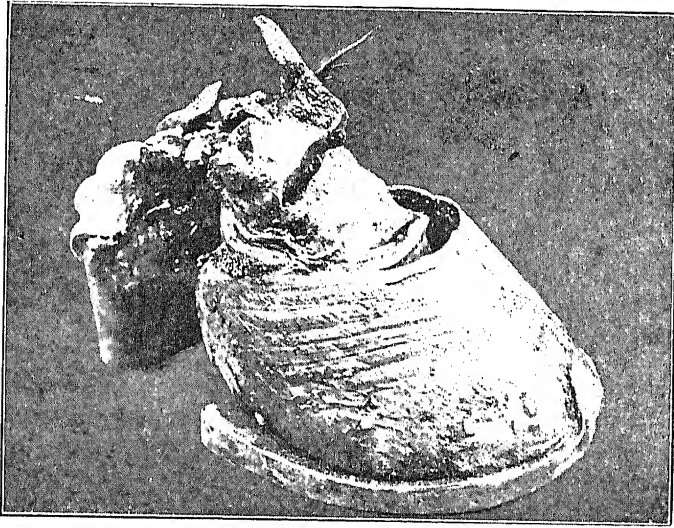


FIG. 2.—FRACTURED LONG PASTERN (*Os SUFFRAGINIS*) INTO THIRTY-FOUR PIECES (*par. 106*).

heavy work on hard roads before their bones are properly set, some breeds being more prone to it than others. When formed on the large shank bone, and well forward towards the front of the bone, although the splint may be of large size and unsightly, it seldom causes any lameness, and is not nearly of so much consequence as when inflammation takes place at certain points of attachment between the large shank and inner small splint bone, along with the exudation of bony material implicating the **interosseous ligament**,

which either becomes absorbed or **ossified**, and the union of the two bones takes place with or without enlargement (*Plate VII., Fig. 3, x*). This may be termed *true splint*, and in many cases causes a very troublesome and protracted lameness. If care and rest, with suitable treatment, be not early adopted, the inflammation and bone formation may extend behind and under the suspensory ligament to the outer splint bone. At its commencement this class of splint is not easily detected, as there is nothing to be seen or felt, only a peculiar lameness, with a characteristic nodding and dropping of the head, *noticeable both on hard and soft ground* when the horse is trotted, while little or no lameness is observed in the walk. On pressing the finger firmly between the large and small bones on the inside, below the knee, the animal shows pain, and may rear up, owing to the sharp twinge produced by the pressure on the inflamed structure.

108. **Treatment** for splint is to give rest, with cold water applications, until the inflammation subsides; then blister and blister, and, if necessary, follow up with the plaster bandage or firing, setoning, etc. Occasionally great benefit is derived from cutting through the skin and dividing the periosteum with a suitable knife. Should the bony deposit become **carious**—worm-eaten—as it sometimes does, cutting down on the part and scraping with a bone spoon may have good effect. The great point in the treatment is to hurry on the inflammatory process to the deposition of healthy bony material, and for this purpose nothing beats the hot iron prongs.

109. **Sore Shins.** See Periostitis, *par.* 69.

110. **Ring Bone** is due to inflammation of the bony structures and deposition of bony material, with enlargement, varying in size. It is found on the large and small **pastern bones**, and may be due to an injury, such as a nip in casting a young colt and tying too tight with a hard rope, or from constitutional causes, such as rheumatic and other hereditary tendencies. It may be considered under two heads—High and Low. **Low ring bone** is seen just above the top of the hoof, and is generally largest at the sides, while **high ring bone** is found a little higher up. Both forms, when not early and properly attended to, may end in **caries** and **anchy-**

losis of the upper and lower pastern bones (*Plate VII., Fig. 2*) or of the lower and coffin bone. Ring bone occurs more frequently in the light-legged horses and half-breeds, also more often in the hind pastern than the fore, and is accompanied by stiffness and lameness, but the pain and enlargement of the parts are the most pronounced symptoms.

111. **Treatment** of ring bone is mainly unsatisfactory. Give rest, and try to arrest the progress of the inflammation and prevent the deposition of bony matter; and for this there is nothing better than a bandage of meadow hay rolled up nicely and put round the leg (but not too tightly), and kept constantly soaked with cold water until the inflammation is reduced. Follow this up with blisters and firing, the hot prongs preferred, assisted by the application of a shoe suitable to the case, according to the form of lameness and parts affected.

112. **Side Bone and Navicular Disease.**—These are fully explained under Lecture IV., on 'The Horse's Foot—Shoeing, etc.' (*pars. 192 and 199*).

113. **Stifle Joint Disease.**—This joint, which corresponds to the knee of man, being a double joint, is, more particularly in an old horse, subject to extensive disease of the bone from hereditary and rheumatic causes (*Plate IX., No. 30*). The bone becomes **carious** (worm-eaten), the cartilages are absorbed, and a porcellaneous deposit takes place between the ends of the bones. Treatment is of very little use. At the outset rest and cold water applications, followed by blistering, firing, and setoning, may have a beneficial effect, or a charge may be applied (*par. 106r*).

114. **Bone Spavin.**—A bony enlargement due to inflammation of the head of the metatarsal or shank bone and the cuneiform bones, with a deposition of bony material, which at times forms an exostosis, or bony enlargement, at the lower, inner part, and partially to the front, of the hock joint of the horse (*Plate IX., No. 34*), and which in many cases causes great pain and lameness and a form of unsoundness. It is brought on by injury or overexertion,

as in jumping, more particularly in young horses when not trained or in condition. The pain frequently is so acute that the animal, when first brought out of the stable, dare scarcely put its foot to the ground, and then, if it does, only on the toe; yet, after going a short distance, the lameness gradually disappears, and the animal goes sound; the lameness, however, returns again after a short rest. The toe of the shoe of a spavined horse, it will be noticed, is generally well worn. Bone spavin is not always easily diagnosed, more particularly when the joints are weedy and dissimilar, and there is an absence of lameness, which is of frequent occurrence in half-bred horses. This causes great difference of opinion to occur amongst members of the profession—spavin or no spavin—more particularly so in case of **occult spavin**, when three or four small bones of the hock become united to such an extent that the original divisions are not distinguishable, there being little or no enlargement outside the bone (*Plate VII., Fig. 5*). These cases are difficult to detect, as little or nothing can be seen or felt outside. A decision, therefore, can only be arrived at by judging the movement of the joint, which, in such cases, is generally carried stiffly, with a roundabout action of the toe inwards. In cases of doubt, lift the foot, take hold of the toe, and press the front of the fetlock against the stifle joint for two or three minutes, then make the animal trot; if it goes very lame, and only puts the toe to the ground, the lameness gradually disappearing with the exercise, it may be concluded that spavin is developing. In some cases a bone spavin may be patent both to the eye and touch, and yet the horse goes sound and does his work correctly. To detect bone spavin, stand about one foot sideways from the animal's shoulder, and look diagonally across the lower and inner part of the hock joint, and compare the joints. When the inflammation is extensive, it may terminate in **caries** or **ulceration**, as when two or more of the bones of the joint become involved; this, as a rule, may be looked upon as incurable, thus showing how necessary it is that *entire rest and careful treatment should be early adopted*.

115. **Treatment** of bone spavin is the same as that laid down for splint and ring bone (*pars. 108 and 111*); but if there is one

thing more than another that firing has a decided benefit upon it is bone spavin, as it hurries the inflammatory action forward to a healthy termination. It must be borne in mind that when we have any extensive accidents or disease of the bones and joints, the muscles surrounding or above the injury waste away, and take a long time before they resume their proper standard and tone.

116. In connexion with the diseases of the bones, special attention may be given to *Plate VII.*, and the text explanatory of the different figures, particularly to the anchylosis of the three bones of the spinal column, or back bone; also the **ring bone**, the bones of the hock, and **occult spavin**; while the mark  $\times$  on *Fig. 3* shows the point of **true splint**, and *Fig. 6* caries of the elbow-joint. *Figs. 7 and 8* are good specimens of **side bones**, or ossification of the lateral cartilages of the foot.

### LECTURE III

## MYOLOGY, OR THE STUDY OF THE MUSCULAR SYSTEM

117. Muscle, or flesh, is a contractile, fibrous structure, and forms the bulk and symmetry of the body. It is composed of bundles of small fibres held together by connective tissue, and is in intimate connexion with the bony structures. Muscles are the active organs of locomotion, and are also found entering into the formation of the walls of various organs of the body, as the stomach, bladder, etc. There are two kinds of muscles—**striped** or **voluntary**, and **non-striped** or **involuntary**. The voluntary muscles are under the control of the will—as, for example, those of the legs, etc.—while the involuntary muscles carry on the functions of the body independently of the will, as those of the intestines, uterus blood-vessels, etc. The muscle of the heart, however, though involuntary, is striped.

118. A **Voluntary** muscle may be said to consist of three parts: First, the tendinous origin—*i.e.*, where it arises; second, the body, or fleshy part—the contractile portion, or tissue, which does all the work, producing the movements of the body; and third, the termination in the pale yellowish-white glistening bands, or fibrous cords, called **tendons**, or sinews, which are extremely strong, though very light. These latter are inserted into the various portions of the bony structure, which are to be acted upon in locomotion, and thus attach the muscle to the bone.

119. Muscles, like bones, have particular names, according to their situation, form, attachment, and action, and they are well

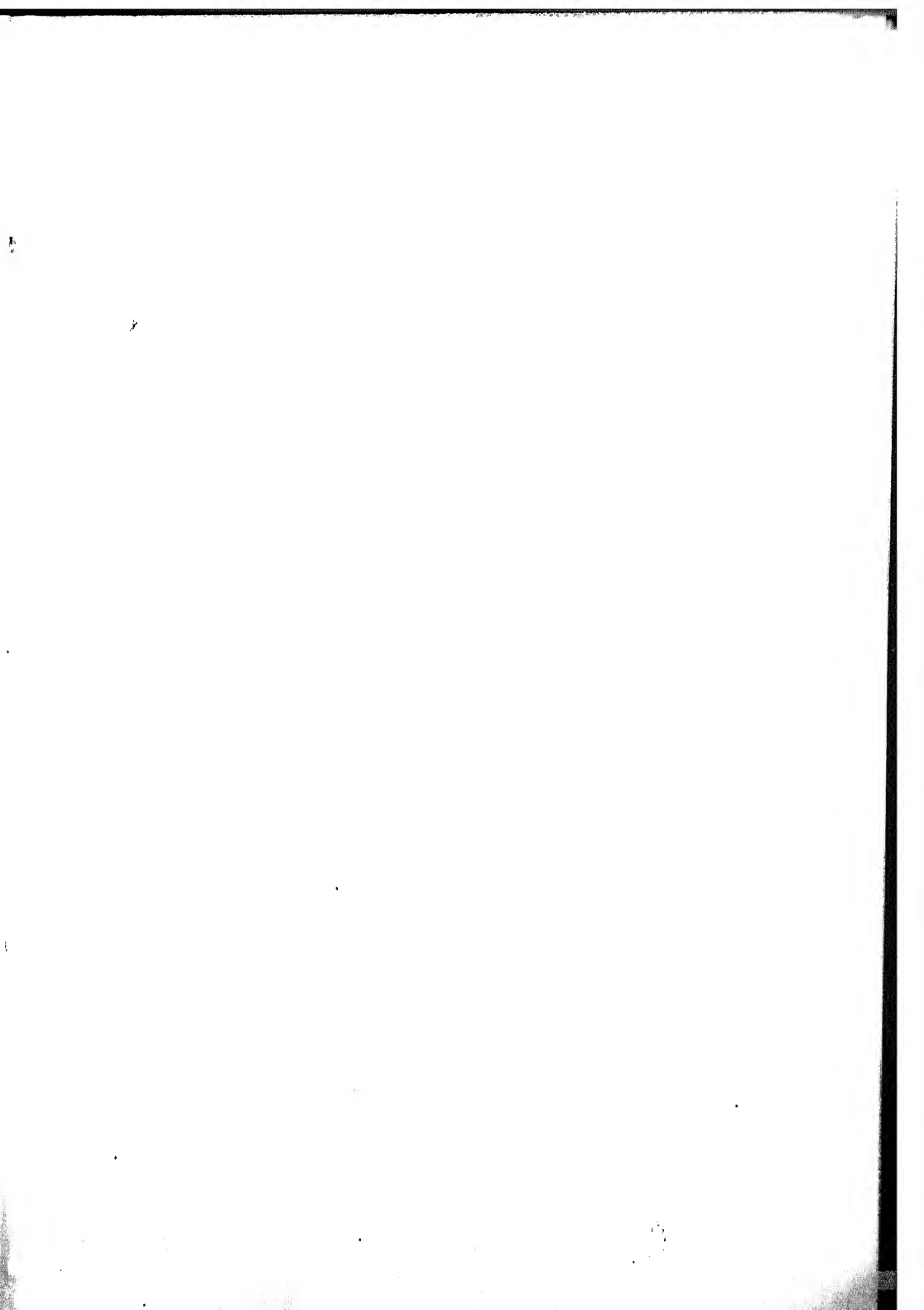
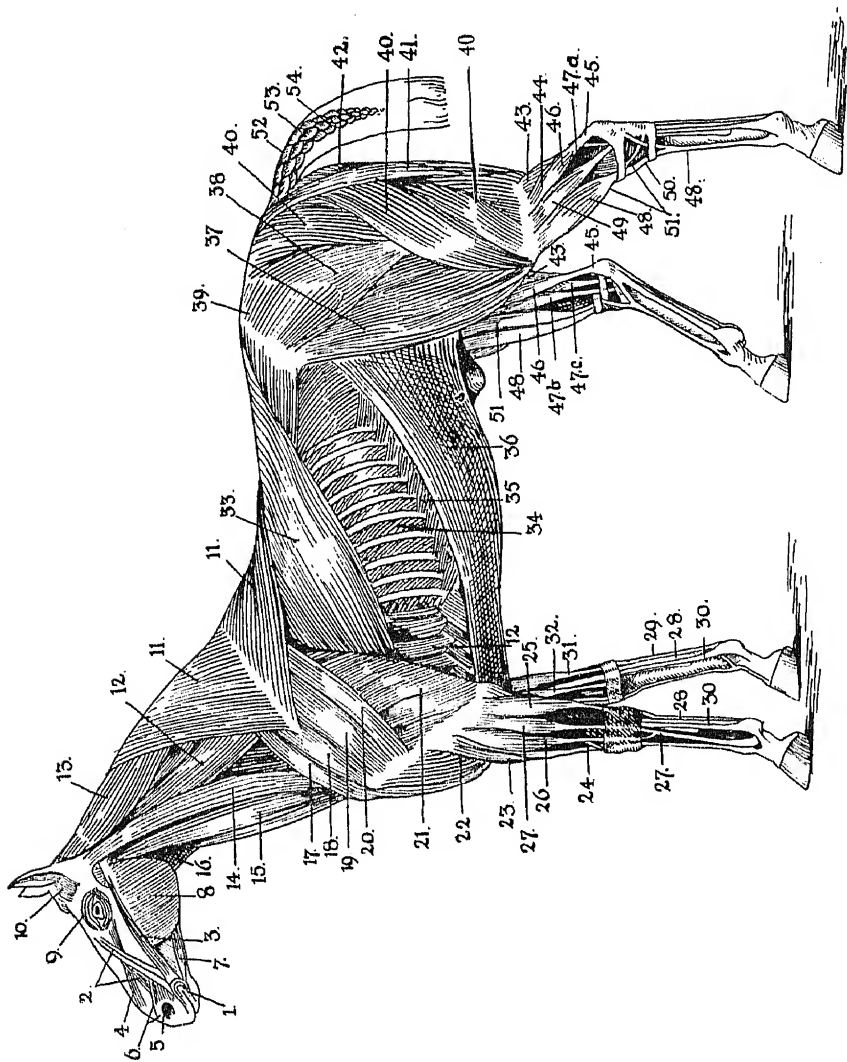




PLATE VIII



## EXPLANATION OF PLATE VIII

### THE MUSCLES OF A HORSE

1. Circular Muscle of the Lips.
2. Elevator of the Upper Lip and Wing of the Nostril.
3. Zygomaticus.
4. Proper Elevator of the Upper Lip.
5. Transverse Muscle of the Nose.
6. Pyramidal Muscle of the Nose.
7. Depressor Muscle of the Under Lip.
8. Masticator Muscle.
9. Circular Muscle of the Eyelids.
10. Temporalis Muscle.
11. Trapezius.
12. Cervical Portion of the Serratus Magnus, the Chest Division being behind the Shoulder.
13. Splenius.
14. Mastoido-Humeralis, or Levator-Humeri.
15. Sterno-Maxillaris.
16. Scapulo-Hyoides (the upper part is alone visible).
17. Pectoralis Parvus.
18. Antea Spinatus.
19. Postea Spinatus.
20. Teres Externus, or Long Abductor of the Arm.
21. Triceps Extensor Brachii.
22. Coraco-Brachialis.
23. Extensor Metacarpi Magnus.
24. Extensor Metacarpus Obliquus.
25. External Flexor of the Metacarpus.
26. Anterior Extensor of the Phalanges.
27. Extensor Suffraginis.
28. Flexor Perforans and its Tendon.
29. Flexor Perforatus and its Tendon.
30. Suspensory Ligament of the Fetlock.
31. Oblique Flexor of the Metacarpus.
32. Internal Flexor of the Metacarpus.
33. Latissimus Dorsi.
34. Intercostal Muscles.
35. Obliquus Abdominis Externus.
36. Rectus Abdominis.
37. Muscle of the Fascia Lata.
38. Gluteus Maximus.
39. The Upper Part of the Gluteus Externus or Superficialis.
40. Triceps Abductor Femoris.
41. Semi-Tendinosus.
42. Semi-Membranosus (only a small portion is visible).
43. Gastrocnemius.
44. Soleus.
45. The Tendo Achillis, which comes from the Gastrocnemius Muscle, but it is also partly formed by the
46. Superficial Flexor of the Phalanges or Perforatus.
47. Deep Flexor of the Phalanges or Perforatus—(a) Lateral, (b) Middle, (c) Larger Heads.
48. Anterior Extensor of the Phalanges.
49. Lateral Extensor of the Phalanges.
50. Oblique Flexor of the Phalanges.
51. Flexor of the Metatarsus.
52. Muscles which elevate the Tail.
53. Muscles which curve or draw the Tail to one side.
54. Muscles which curve or draw the Tail downwards.

supplied with bloodvessels, nerves, and absorbents (*Plate VIII.*). Their action is under the influence of the nervous system. Muscle, in a state of rest, is said to be neutral, or slightly alkaline, but becomes acid when in action. In close connexion with the muscular system there is also other tissues, such as cellular, white fibrous, yellow elastic, and adipose.

120. **Cellular or Areolar Tissue** consists of small filaments interwoven together, forming a network. It is found in the different organs of the body, giving support to their substance, also binding them together and holding them in position. Cellular tissue is loose connective tissue having large interspaces.

121. **White Fibrous Tissue** is made up of bundles of very fine white fibres, and is the very tough, unyielding substance found in the tendons of muscles and most ligaments; it is also present in the periosteum, pericardium, etc. Fibrous tissue is the connective tissue of the body, and composed of fibres.

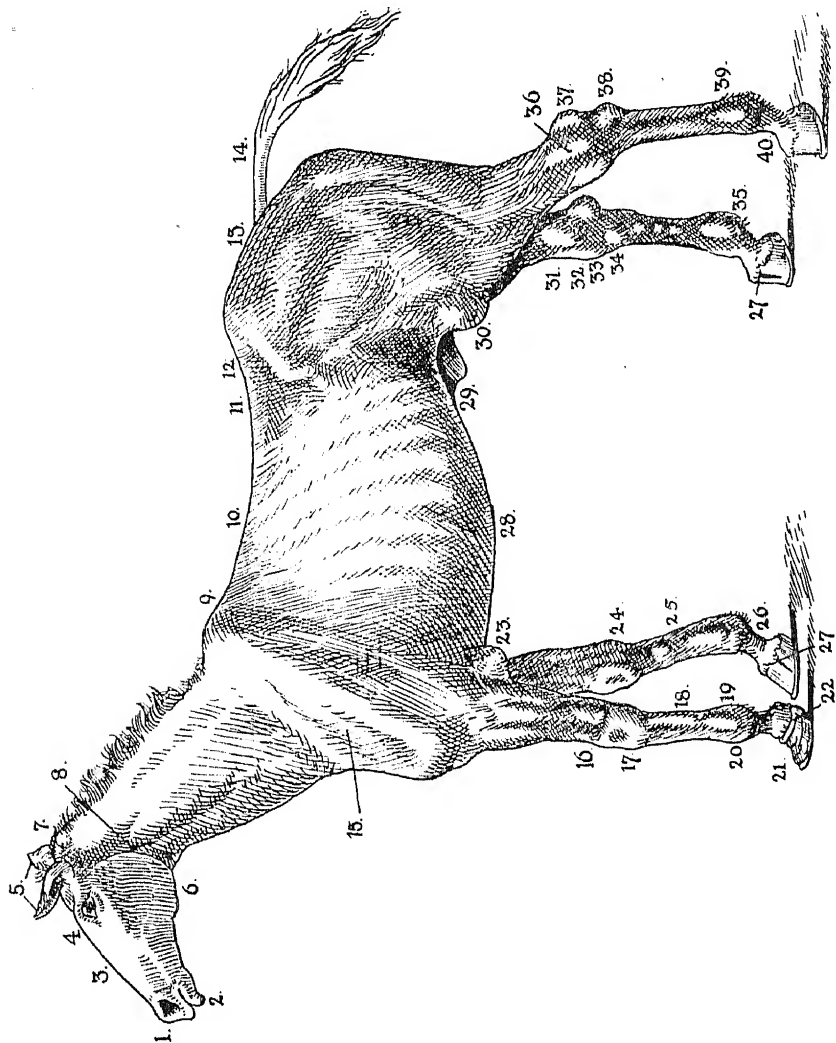
122. **Yellow Elastic Tissue** consists of yellow elastic branching fibres, which are much larger than those of the white fibrous tissue, but not so tough or strong, and, as the name indicates, more elastic. It is of this connective tissue that the middle coat of the larger arteries is formed, and it is very plentiful beneath the skin. It is also found in certain ligaments, the *ligamentum nuchæ*, for example, being entirely composed of this tissue.

123. **Adipose or Fatty Tissue** consists of a number of cells containing an oily substance, held together by a network of areolar tissue. It is found in nearly every part of the body—underneath the skin, around joints, and enveloping the kidneys, etc.

124. **Tendons or Sinews** are amber-coloured, dense fibrous structures, forming bands and cords attaching muscles to the bones, and found at the ends of muscles at their points of origin and termination. They are most abundant in the lower parts of the extremities, shielding and protecting joints; at other times they are spread out like a fine, strong, thin membrane, according to their situation and action. They are very strong and fibrous, combining great strength with lightness; their extreme strength being well



PLATE IX



## EXPLANATION OF PLATE IX

### HORSE, SHOWING VARIOUS DEFORMITIES AND DISEASES

- |                                   |   |
|-----------------------------------|---|
| 1. Nostrils.                      | 22. Sidebone.                                 |
| 2. Dropped Lip.                   | 23. Capped Elbow.                             |
| 3. Roman Nose.                    | 24. Mallenders.                               |
| 4. Eye.                           | 25. Seat of Splint and Speedy Cut.            |
| 5. Lop or Pig Ears.               | 26. Cracked Heels.                            |
| 6. Sub-Maxillary Glands.          | 27. Sanderack at Quarter.                     |
| 7. Poll Evil.                     | 28. Flat Ribbed.                              |
| 8. Parotid Gland.                 | 29. Tucked-up Flank.                          |
| 9. Fistulous Withers.             | 30. Enlarged Stifle-Joint.                    |
| 10. Saddle Galls.                 | 31. Bursal Enlargement.                       |
| 11. Loins.                        | 32. Bog Spavin.                               |
| 12. Ragged Hooks.                 | 33. Sallenders.                               |
| 13. Mule or Goose Rumped.         | 34. Bone Spavin.                              |
| 14. Rat-Tailed.                   | 35. Grease or Grapes.                         |
| 15. Shoulder Galls.               | 36. Thoroughpin.                              |
| 16. Knee Windgalls.               | 37. Capped Hock.                              |
| 17. Broken Knees.                 | 38. Curb.                                     |
| 18. Sprained Tendon.              | 39. Enlarged Fetlock.                         |
| 19. Windgalls.                    | 40. Knuckling Forward from Contracted Tendon. |
| 20. Knuckling Over at Fetlock.    |   |
| 21. Foot Deformed from Laminitis. |   |

illustrated by the everyday occurrence of slaughtered animals being suspended by their *Achilles tendon*, or ham-strings. Tendons are brought into action by the middle or fleshy part of the muscle contracting and relaxing. To keep the muscles in proper order, good grooming and regular exercise are highly necessary—a profession in itself—as in training race-horses, etc.

125. **Involuntary or Non-Striated or Non-Striped Muscle** consists of spindle-shaped cells, each with its own nucleus. The cells are arranged in such a manner that they overlap, and are held together by a small amount of intercellular cementing substance. They are most commonly collected into bundles of varying size, which may cross each other or interlace. Although involuntary muscle, as its name indicates, is beyond the control of the will, it is none the less necessary that it should be supplied with nerves. It is chiefly found in the walls of hollow viscera, such as the stomach and intestines, the urinary bladder, the uterus, etc., and also forms an important constituent in the formation of the coats of bloodvessels. In the hollow viscera the muscular tissue is very pale, thus differing materially in appearance from the voluntary muscles of the body. The heart contains a form of muscular tissue which is involuntary, but possesses a deep red colour.

126. **Muscles and Tendons** are subject to *injury* and *disease* of various kinds. Injury may be caused by **wounds**, and these may be—

- (1) **Incised**—*i.e.*, clean cut, as with a sharp cutting instrument.
- (2) **Bruised or Contused**, when caused by severe blows or falls.
- (3) **Lacerated**, when the skin and flesh are torn by a foreign body, as by barbed wire or a cart shaft, etc.
- (4) **Punctured**, when made by a pointed object, as a prick or probe with thorns, or stabs with pitch-forks, etc.
- (5) **Gun-Shot**—from shot, bullets, etc.
- (6) **Poisoned**—from, say, the use of arsenical sheep-dip, wasp-stings, snake-bites, etc.

127. Of the foregoing, the only one that might heal by first intention is the incised or clean-cut wound ; but such is rarely seen in domestic animals. However simple the injury may be, it ought to have early care and attention, as it might result in sloughing, or mortification with *septicæmic* blood-poisoning, or *pyæmia*, as when abscesses are formed in different parts of the body—well exemplified in bastard strangles.

128. **Incised Wounds** are wounds caused by sharp cutting instruments. *Treatment.*—First examine the part, remove all the blood-clots, etc., from the wound, and stop the bleeding. If the blood be *bright scarlet* and spurting out in jerks, an **artery** has been wounded. To arrest the bleeding, at once, when practicable, tie a cord, handkerchief, or bandage loosely around the limb, above the wound ; insert a pocket-knife or piece of stick beneath the cord or bandage, and twist it round and round tightly until the bleeding stops, when the ends of the damaged vessel may be tied with a piece of silk, or even cotton, thread. Arteries are sometimes injured on one side only ; this is very dangerous, and the bleeding is difficult to stop. In this case the vessel has to be completely divided—which should only be done by a professional man—when the cut ends will contract into the neighbouring parts and the bleeding cease. Blood from **veins** is *dark red*, and pours out of the wound in a continuous stream, turning brighter in colour as it runs down the leg or side, under the oxidizing action of the air. This bleeding may be stopped by applying the point of a red-hot poker to the vessel, or by placing a pad of tow over the place and securing it with a bandage where practicable. Plugging the wound with tow (which can be readily made by teasing out a piece of soft rope) is also of great service, and should be done thus : First soak the tow well with antiseptic mixture (*par. 1060, No. III.*), then plug it tightly into the bottom of the wound, securing it in the place by pulling the edges of the wound together with stitches of antiseptic silk, cord, catgut, or silver wire. In about thirty or forty hours after the plug may be carefully removed and the injured part re-dressed with the antiseptic mixture.



129. When the cut surface casts off a fine thick, yellowish-white, creamy pus, or matter, and the wound assumes a nice strawberry colour, it is a sign that healthy action has taken place, in the shape of granulation. Excessive granulations, however, must be kept in check by the application of some caustic lotion or powder (*par. 1060, Nos. V. and VI.*). To keep down undue inflammatory action nothing is better than cold water bandages or cloths kept constantly wet by pouring cold water over them from time to time. These should be continued until healthy matter is seen coming from the wound (*par. 33*).

130. After the edges of a clean-cut wound have been drawn together with stitches—sutures—I have frequently seen good results from covering the part with green (Stockholm) tar. This acts as a good antiseptic, and keeps the air from the wound; it also has a tendency to keep the stitches from suppurating out, thus preventing the lips from gaping open. This is of most value in cases of injury to the neck, ribs, hips, and thighs. When bandages can be used, a pledget or small compress of tow or cotton-wool, saturated with a mixture of oak varnish and iodoform, can be applied to the wound before putting on the bandage (*par. 1060, No. VII.*).

131. **Bruised and Contused Wounds** may be considered as one, and are those in which the parts are injured with or without an abrasion of the skin—a good example being a black eye in the human subject. In domestic animals these wounds are generally caused by kicks, blows, prods from a cow's horn, slipping on ice, etc. The bleeding takes place under the skin, the blood coagulating and arresting the hæmorrhage. Sometimes these injuries are very extensive, and should not be interfered with by an amateur, nor should they be cut into for eight or nine days, when a good opening must be made and the clotted blood removed; the wound may then be dressed with the antiseptic mixture and tow (*par. 128*). Frequently they suppurate and form matter; or the watery portions may become absorbed and the solids organized, and form a big hard lump—a tumour. A good example is the breaking of the 'belly-rind' by one cow 'dumping' another, or through the kick

of a brutal cattle-man or horse-man. In such cases cold water bandages can be applied, or the parts may be thickly and loosely covered with cotton wadding and firmly bandaged.

132. **Lacerated Wounds** are when the skin, flesh, and tissue are torn in an irregular or jagged manner, and caused by the animal coming in contact with some sharp body, such as barbed wire. Strange to say, we have little or no bleeding from this class of wounds. Their treatment is simple: Dress with the antiseptic mixture, and draw the parts together with sutures; then keep the inflammation in abeyance, by means of cold water applications, until healthy matter comes from the wound, which generally heals by granulation—this, of course, must be kept in check by caustic applications (*par. 1060, Nos. V. and VI.*).

133. **Punctured Wounds** are produced by sharp-pointed objects, such as knives, pitchforks, stakes, thorns, etc., and are at all times regarded as dangerous. A minute examination should be made, as frequently a piece of wood, etc., is found, after many days, at the bottom of the wound. In all cases the foreign body should be carefully removed where practicable; but in some cases it is dangerous to remove it at first, and it has to be left to suppurate out of itself, or until it can be removed without risk. When the bleeding is excessive it must be stopped by plugging, and the part treated as described under Incised Wounds (*par. 128*). There is always a great danger of blood-poisoning setting in, especially if the thick part of a muscle be injured; and in no case should this description of wound be 'tinkered' with, more particularly if the wound takes a downward direction—*i.e.*, the internal part of the wound is lower than the external opening—in which case it has to be cut into. Punctures from thorns, in the hunting-field, often cause a great deal of lameness, as well as constitutional disturbance, more particularly if in the knee, hock, or other joint; and if a piece of thorn has been broken in under the skin cold water bandages answer best until suppuration sets in, when the thorn can be removed. Punctured wounds also frequently cause lock-jaw, when the irritating cause is such as nails in the feet.

134. **Gun-Shot Wounds** are caused by bullets and shot, and are mostly met with in time of war, but are frequently found in dogs. The bullets or pellets should be removed if practicable, then dress as under Incised Wounds (*par.* 128); but the bullets or pellets may often be left in the part with safety, Nature enveloping them with a covering of dense tissue, when they cause little inconvenience.

135. **Poisoned Wounds** may be due to poisonous medical agents, to bites and stings of different animals, or to septic organisms. Where the skin has been damaged by lice or otherwise, numerous animals have been poisoned by being subsequently washed with arsenical dips, *therefore arsenical preparations should never, under any circumstances, be used for washing horses, cows, or dogs affected with lice.* Poisoned wounds in animals are also caused by wasp-sting, snake-bite, etc. For stings, apply a diluted solution of ammonia. In bites from dogs, the best treatment is to wash the part well with cold water, and apply tincture of iron. (For Septic Poisoning, *see par.* 34.)

136. From wounds of every description we may have a great deal of constitutional disturbance—sympathetic fever—when the temperature rises to 104° or 106°. This also must be attended to (*par.* 38). All wounds in the process of healing are greatly assisted by a daily application of a solution of iodine prepared as follows: Iodine 1 drachm, iodide of potassium 2 drachms, water 1 pint, mixed, and a little applied with a feather.

137. **Lacerated Muscles.**—Muscles occasionally become lacerated, or torn, without the skin being broken or any swelling or lameness being visible, the animal merely going 'stiff.' All the muscles of the body, those of the neck, back, loins, quarters, etc.—from slipping on the ice, falling, galloping, jumping, etc.—are liable to this; and to arrive at a proper conclusion, the history of what the animal had been doing previously is indispensable. Frequently nothing is seen until the flesh is noticed to waste away from the part—as, for example, the so-called shoulder-slip in young horses when first put to work. If the animal does show lameness, rest, with cold water irrigation by means of the hosepipe, or tub and tube irrigation, several times a day, answers well (*par.* 77), and a

run at grass is to be highly recommended, while, at times, blistering may be found expedient.

138. **Lameness of the Shoulder** may arise from many causes, such as an injury to the muscles of the shoulder, or to the long muscle of the neck, or to rheumatism, disease of the liver, or even a slight disorder of the stomach, caused by a feed of new oats, Indian corn, or strange food of any kind, inducing indigestion. In all these cases the symptoms of the lameness are much alike: the limb is carried stiffly, and swung in a round-about, outward manner, with dragging of the toe. To detect from what source it arises, the history of the case is necessary, accompanied by the eye and finger of an expert. It may be from any one of those already enumerated, or others not mentioned, so that a careful and proper examination must be made before any treatment is adopted. If from injury, cold water irrigation daily, followed by blisters and long rest, should be resorted to; if from indigestion or change of food, one ounce of carbonate of soda daily for a few days in the food will be found very beneficial.

139. **The Shoulder Joint** is also frequently the seat of disease, either from injury of the joint itself or through the muscle—**flexor brachii**—as it passes over the head of the humerus, being sprained, or from the sprain of some of the muscles in the near neighbourhood of the joint. The point of the shoulder is occasionally damaged by the animal running against some hard substance, such as a stone wall, etc. Any one of these injuries causes great pain, lameness, and enlargement of the parts.

140. **Treatment.**—Rest is the first essential; then hot or cold applications of water may be tried, followed by blistering. Setons act well at times in such cases, with a run out on grass.

141. **Rheumatism** may be regarded as being due to some peculiarity in the blood, the exact nature of which is not as yet known, and is both acute and chronic. Nearly all the structures of the body are subject to its baneful influence. It is not, however, so common in the horse as in the human subject; but, from long

observation, I have met with it in certain breeds of horses, and have generally traced it to hereditary causes, and have usually found it associated with heart affections.

142. **Treatment** of rheumatism is not very satisfactory, but when much pain and constitutional fever are present, ounce doses of sulphate of magnesia or sulphate of soda, along with  $\frac{1}{4}$  oz. of nitrate of potash, may be given night and morning, in a mash, with 2 to 3 drachms of salicylate of soda at noon, or quinine in 1 to 2 drachm doses twice a day; if the pain is very acute, hypodermic injections of morphia are useful.

143. **Cripples, or Crockles**, is a rheumatic affection of the muscles from which cattle sometimes suffer, and which is generally known by these names, most frequently occurs on strong, undrained land or on sour, mossy ground. The animal suffering arches its back and walks as if on stilts; it becomes hidebound, milk and flesh disappear rapidly, and the beast is very fond of chewing bones, stones, and foreign bodies. A change of pasture, with doses of 10 ounces linseed oil and 1 ounce of turpentine, twice or thrice weekly, I have found to answer best in such a case. Dressing the land with lime or salt is also to be highly recommended. In some farm buildings young bulls under twelve months old are occasionally affected in a similar manner, and I attribute it to the arrangement of the boxes, their imperfect sanitation and ventilation, but more particularly their ground floor, which is frequently found to be laid with old red sandstone flags, having bad drainage, and with ground damp evaporation. In these cases I always recommend that the floor be pulled up, the soil dug to the depth of 8 or 10 inches, then filled with stones, bricks, sand, etc., and paved on the top with the old-fashioned blue cobble or fluted stable bricks. Dry wooden portable beds, raised 4 to 6 inches, also answer admirably. The animal also ought to have the run of a large yard or paddock in dry weather, while half the quantity of oil and turpentine mentioned above should be given. Two-drachm doses of salicylate of soda may also be given once or twice a day.

144. **Kennel Cripple or Lameness** in dogs is a form of rheu-

matism, and is not now so common as formerly. It is analogous to the foregoing complaint, and due to a similar cause. Sanitation, ventilation, and good dry wooden beds, raised 18 to 20 inches from the ground, are necessary, as well as a good dry ground floor. Change of quarters, and 15 to 20 grain doses of salicylate of soda twice a day, are recommended for the treatment of this disorder.

145. **Poll Evil** is of an ulcerative or fistulous character, with open sores discharging a thin glairy matter; it is a very troublesome complaint, and occurs just behind the ears (*Plate IX., No. 7*). It is caused by an injury to this part, for instance, from a blow with a big stick, wielded by a brutal stableman, or through the horse, when in a low-ceilinged stable, throwing up its head and striking itself against the beams, or from a heavy, grandly furnished bridle. At first the animal goes with its neck very stiff, and points its nose, with drooping head; it flinches when the collar or bridle is put on; and then swelling of the part is next noticed. As this is a very formidable disease to deal with, it should at once be put in the hands of a qualified man. At first cold water cloths ought to be constantly applied, afterwards blistering may be necessary, and, finally, an operation. As the part affected is of low vitality, great care and judicious treatment must be exercised, or the disease may extend to, and cause, *caries* of the bones. Injecting the sinuses with a solution of peroxide of hydrogen answers well both for this and also for fistulous withers.

146. **Fistulous Withers** is similar in character to poll evil, and, as the name indicates, is a disease found at the top of the shoulders (*Plate IX., No. 9*). It is due to some damage done to the neighbouring parts, as from one horse biting another; or through injuries to the bony spines by blows; or from nips from badly fitting riding or harness saddles. Here again swelling is the first visible indication, and prompt attention is necessary. Cold water cloths should be applied and kept constantly wet, and the saddles must be examined and altered; again, on account of its formidable nature, the case should not be 'tinkered' with, but must be immediately placed in the hands of a professional man.

147. **Elbow-Joint** (*Plate IX., No. 23*) is also subject to injury from kicks and blows, as well as from the shoes being made too long, or with too much caulking, thus damaging the elbow-point when the animal lies down. If the shoe is the cause, it must be at once removed and remedied to prevent further injuries from that source; a stocking-leg stuffed with horsehair, or special pad, should be placed round the pastern every night. Hot or cold fomentations ought to be applied to the damaged elbow, night and morning, with soothing absorbent lotions (*par. 1069, No. 1*), but beware of strong, stimulating embrocations. Should the tumour be soft to the touch, and just underneath the skin, it may contain watery fluid (serum), or matter, when it will have to be opened; if it is hard, or deeply seated, a small piece of 15 per cent. of oleate of mercury, applied every other day, can be tried.

148. **Broken Knee** (*Plate IX., No. 17*) is an injury of greater or less extent done to the front of the knee, and of frequent occurrence. In some cases it is slight, only abrasion of the skin, in others so extensive that the joint may be permanently damaged; particularly so when it is laid open and the ligaments and tendons injured. The parts to be treated must be properly cleansed from all sand, grit, etc., then a pledget of tow, saturated in the antiseptic mixture (*par. 1060, No. 3*), should be applied, secured with cold water bandages, which must be kept constantly wet and not removed for three days, unless the leg swells very much. The animal should have its head tied close up to the rack, so that it cannot lie down. Any constitutional disturbance that may arise must be treated as **sympathetic fever** (*par. 38*). If the joint be damaged, and joint oil run from the wound, a special tin splint must be placed at the back of the knee to keep it steady. The cold water bandages keep the inflammatory process in check, conducing to healthy action and closing the wound by granulation, which may appear in eight to ten days; then the cloths must be removed and the wounds left bare, dressing it daily with suitable caustic lotions or a preparation of iodoform (*par. 1060, No. 7*). A good blister and a run at grass may be

necessary, but the skin, once destroyed, is never reproduced. In treating these cases, great care is required in dieting the animals, keeping them cool and quiet, as at times lock-jaw supervenes. When the injury is slight, dressing the parts either with Friar's Balsam or flexible collodion twice a day is all that is required.

149. **Speedy-Cut.**—This is a bruise on the inside of the fore-leg. It may be between the knee and fetlock, at the knee, or even, in a high-actioned horse, above the knee. It comes under the class of contused or bruised wounds, and is caused by the horse striking the inside of one fore-leg with the opposite foot; very careful shoeing is required, while the damaged part should be treated as under Contused Wounds (*par. 131*).

150. **Brushing and Cutting** may be classed under the same heading as *speedy-cut*, being caused by one foot striking the fetlock of the opposite leg; both fore and hind fetlocks are liable to the injury, but the hind ones more frequently than the fore. The causes vary: sometimes it is the outer rim of the inner web of the shoe that brushes or cuts the joint; in other cases the toe or inner quarter of the hoof itself is at fault (*par. 177, No. 9*).

151. **Sprain of the Tendons or Back Sinews** and their sheaths may be said to be laceration of the tendinous fibres, causing heat and a painful swelling. This usually occurs below the knee, just where the inferior check ligament joins the tendon (*Plate IX., No. 18; also Plate XI., Fig. 6, E*), but any portion of the latter is liable to lesions, and it is most frequently seen in the fore-leg, specially in cart-horses having heavy loads to pull up steep hills. High-heeled and high-toed shoes may have something to do with causing it, also slipping on ice, overreaching in jumping, etc. The animal steps short, and rests the limb whenever it has a chance. On examining the leg the damaged part is found to be swollen and painful on pressure. The most essential point towards recovery in such cases is entire rest from work; but this rule is 'more honoured in the breach than in the observance,' and the poor brute is frequently kept at work till repair is hopeless. First, then, as



already said, entire rest is necessary ; next, the application of a cold water bandage. The shoe must be removed and the heel slightly elevated, so as to act as a support to the part ; or the following, as recommended by Captain M. H. Hayes, F.R.C.V.S., may be tried : 'A good ply of cotton wadding to be wrapped loosely round the part, and held in its place by a long calico bandage rolled firmly round the leg, to be taken off and re-wrapped once every twenty-four hours.' After the active symptoms have abated, blistering should be resorted to and the animal turned out to grass. Firing before turning out may be necessary, and is as a rule very effectual, and at times good results are obtained by the application of the adhesive plaster bandage. When the animal is worked too long and the case neglected, the tendon becomes so much contracted that the fetlock knuckles over and the animal walks on its toe. A special shoe with a turned-up toe is required for this, and the operation of **tenotomy**—dividing the tendon—has to be performed. From this it will be seen how highly necessary it is to give rest in the first stages, and thus obviate future ill-consequences.

152. **Break-down**—a laceration of the suspensory ligament, the flexor tendons, or fracture of the sesamoid bones, allowing the back of the fetlock to come to the ground—is of common occurrence in race-horses, steeplechasers, and hunters. For this cold water bandages with splints may be applied until the active inflammation is arrested ; the animal should also be put on slings, and dieted on mash or green food ; finally, a plaster-of-Paris bandage or the adhesive plaster bandage may be applied, and the horse turned out to grass.

153. **Sesamoiditis** is inflammation of the joint at the back of the fetlock, due to some injury, either to the small bones or to the ligaments or tendons in connexion with them (*Plate IX., No. 39*). The parts are much swollen and tender to the touch, while the fetlock stands forward and the animal steps short. When certain that this is the seat of lameness, cold water bandages can be used first with complete rest, and the adhesive plaster bandage may be applied, but, finally, blistering or firing may have to be resorted to. In the early stages of both *break-down* and *sesamoiditis* the cotton

wadding wrapping with bandage and splints can also be used as noted in Sprain of the Tendons (*par. 157*).

154. **Hip-Joint Lameness** may arise from a variety of causes, such as sprain of the muscles, tendons, or ligaments in connexion with the joint and the head of the hip bone. As in the fore-leg the shoulder was generally considered the seat of lameness, so in the hind-leg the hip is often pointed to when the cause is really in some portion of the limb below, thus showing that lameness in this part is by no means easy to trace, as it may arise from muscular sprain, or from some nervous derangement, such as sciatica, etc. So that before any treatment is adopted a qualified practitioner should be consulted, as I have often seen a large surface of the skin permanently damaged by the use of some fancy advertised quack nostrum, the animal having rubbed the part after application and thus destroyed the skin. When certain that the lameness is in the hip, rest, with cold water irrigation for two or three hours twice daily, is of great service. Blisters, setons, and pitch charges are, when desirable, of great benefit.

155. **Windgall** is a puffy, elastic swelling caused by an over-secretion of synovia of the *bursa mucosa*, a fluid similar to joint oil, and is of very common occurrence in nearly all classes of animals, found at the knee and fetlock joints, etc. (*Plate IX., Nos. 16 and 19*). Some classes or stamps of animals are more prone to it than others. The swelling may be brought on by overwork, or by putting the animal to work too soon. It very rarely causes lameness, or in any way interferes with the usefulness of the animal; but still, it is very unsightly and objectionable, and not easily removed. The treatment consists of rest, the application of a cold water, indiarubber, or adhesive plaster bandage and blistering; also firing, when very large. In olden times the enlargement was supposed to contain wind, hence the name.

156. **Bog Spavin** is an overdistension of the capsular ligament of the hock joint, with synovia, and is found on the front and inner part of the hock joint (*Plate IX., No. 32*), and is of the same nature as windgall. It is mostly seen in cart-horses, certain strains

of Clydesdales having a special tendency to it; and it is frequently found in young horses rising two years old, more particularly in overfed, forced animals. It very rarely occasions lameness, and sometimes disappears without any treatment. If hard feeding is thought to be the cause, it should be diminished, and the animal turned out to grass, after applying a good dressing of green tar to the part. Compression, by means of an indiarubber bandage, has also a splendid effect, but when lameness is present blistering and, subsequently, firing have to be resorted to.

157. **Thorough Pin.**—An enlargement of the synovial sac through which one of the tendons passes, and is situated behind the main joint, and in front of the *os calcis*, or point of the hock (*Plate IX., No. 36*). It varies very much in size, and is generally seen more prominently on the outside than on the inside, or *vice versa*, and sometimes it is right through. Pressure on one side makes it more apparent on the other. It seldom causes lameness, but, being unsightly, is very objectionable, and is frequently associated with *large bog spavin*. The treatment greatly resembles that for windgall (*par. 155*). An indiarubber bandage may be applied, or a truss specially prepared for the hock joint may be used, causing compression and absorption. A winter's run at grass, with green tar dressings of the affected part, have also been found to answer splendidly. These bursal distensions, like *windgall*, *bog spavin*, and *thorough pin*, when very large, are sometimes tapped and the oversecretion drawn off by means of a special instrument, an aspirator; but this should only be attempted by a professional man, as it is very dangerous to admit air into a synovial or serous cavity.

158. **Capped Hock** consists of a swelling on and over the point of the hock (*Plate IX., No. 37*), and is of two kinds, either a *serous* or watery effusion immediately under the skin, or a *synovial* or bursal distension. The *serous capped hock* is caused by kicks or other bruises; when recent, it is very painful to the touch. Soothing treatment is necessary, such as hot or cold applications, accompanied by cooling lotions (*par. 1069, No. 1*). All

stimulating embrocations are to be avoided, as they have a tendency to consolidate the effused products. Some animals get capped hocks by scraping all their litter behind them, and then lying down on the bare brick or pavement. This may be remedied by bedding thickly with sawdust or moss-litter. When the swelling is very large it may be opened and the watery fluid drawn off, but great care is required to distinguish the serous effusion from the synovial secretion, and if the synovial bursa is punctured it might lead to serious consequences. The *synovial capped hock* is generally not so painful as the serous variety, but is more deeply seated, and is best treated by repeated applications of 20 per cent. of oleate of mercury.

159. **Curb.**—An enlargement seen on the back and lower part of the hock joint where the heads of the small metatarsal bones join the lower row of bones of the hock (*Plate IX., No. 38*). There are two kinds of curb, *false* and *true*. **False curb** is an effusion of serum under the skin, due to a sharp blow on the part. The treatment for it consists of hot fomentations or cold water applications, followed by an iodine blister (*par. 1066, No. 3*).

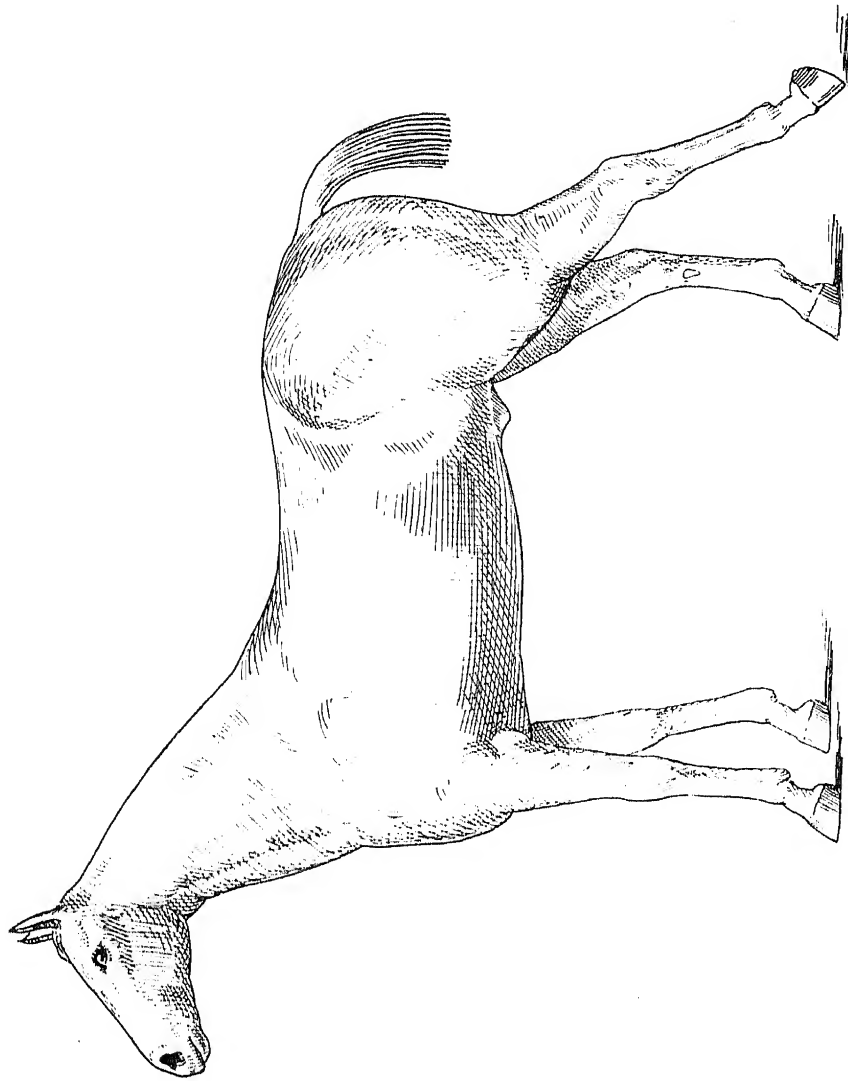
160. **True Curb** is of a more serious nature, and consists either of a sprain of the tendons passing over the seat of curb or laceration of the *calcaneo-cuboid ligament* at its attachments to the cuboid and outer small metatarsal bone. This is caused by overexertion, as when galloping, jumping, rearing up, etc. Some breeds of horses have joints naturally predisposed to curb—called **curby** or **sickle hocks**—and therefore of congenital formation. In *sickle hocks* the head of the metatarsal is set too far back; and the **os calcis**, the upper end of which forms the point of the hock, is too short and straight up, forming a narrow joint, or ‘tied-in’ hock, with a sharp angle at the lower part of the front of it. This class of joint is more subject to curb than a well-formed, broad, and developed one. When the enlargement is seen, and the animal is noticed to be lame or the part found to be tender, it should be put off work, and cooling applications used—such as the hose-pipe irrigation of cold water or a cold water

bandage—until the inflammation is reduced ; then iodine or fly-blisters must be used, but the best and most satisfactory treatment for curb or curby hocks is to fire, in lines. I know of no complaint except bone spavin (*pars. 114 and 115*) on which firing has such a beneficial effect as curb.

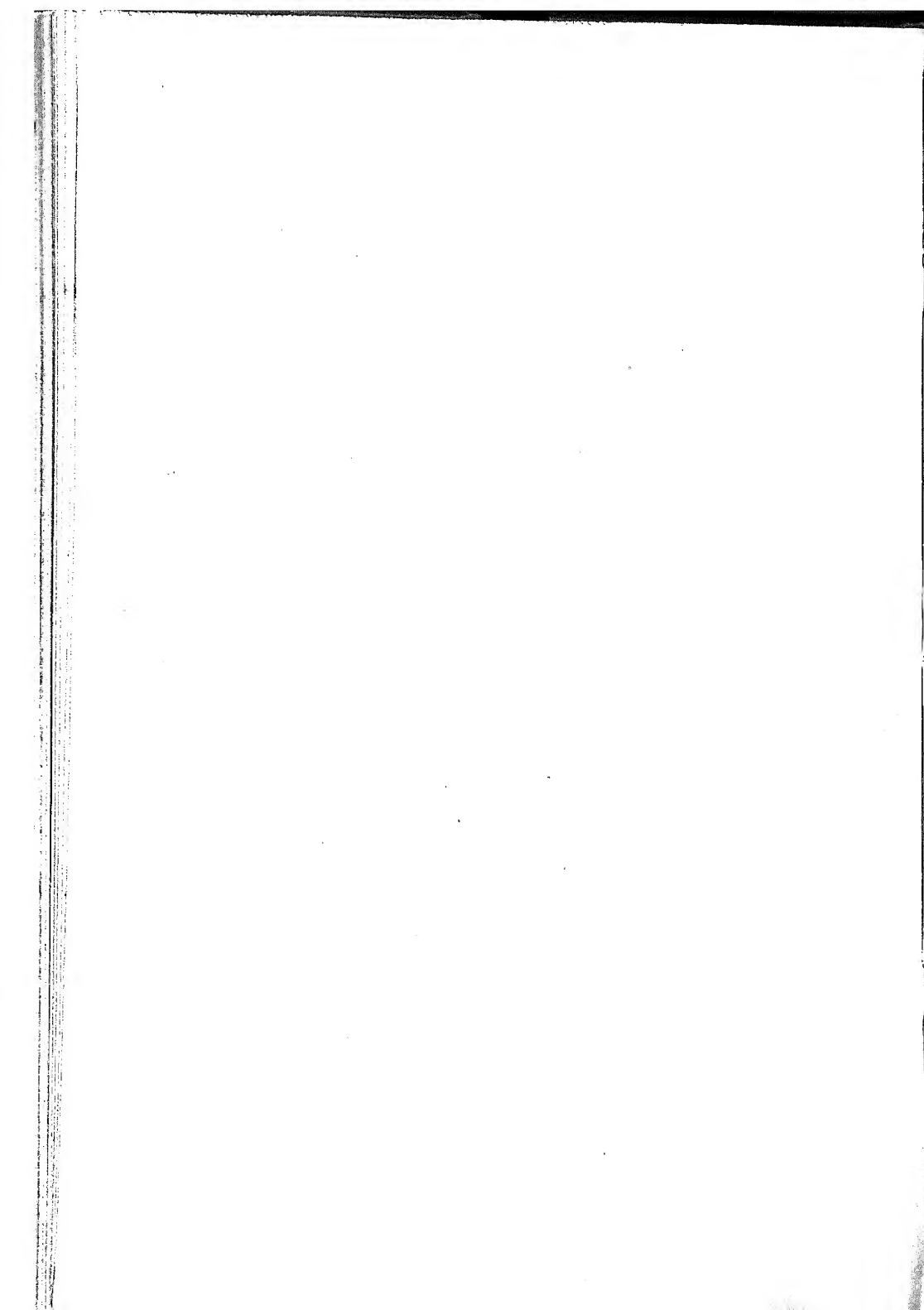
**161. Sprung Hock.**—This injury varies very much in degree ; in slight cases the ligaments only may be affected, but in more severe injuries not only the ligaments, but the tendons and bones, are implicated. Great pain is evinced, with high fever. *Treatment.*—The patient should be supported by slings, and cold water irrigation applied to the joint until the inflammation and pain subside. Hypodermic injections of morphia near the joint have a soothing effect, while the fever must also be combated (*par. 38*).

**162. Open Joint** is an opening into a joint with the escape of synovia or joint oil. All the joints are liable to be laid open from kicks, probes, and other injuries. The joints most frequently damaged in this manner are the knee, elbow, stifle, and hock. The three latter are very formidable to deal with, and, owing to their arrangement, are difficult to treat successfully. When a joint is opened into, it should have immediate attention, or it may end in a stiff joint, or *caries* of the bone, and even in the death of the animal. As soon as it is ascertained that the discharge coming from the wound is joint oil, entire rest must be given, and cold water irrigation resorted to. The water must be kept running constantly over the part for four or six days. I have on many occasions, with this treatment alone, been successful in stopping synovia and healing the joint. Next to this is the application of a good fly-blister, which has generally the desired effect ; and to turn the animal on to the grazing pasture. The blister causes the parts to swell, thus closing up the opening in the joint and preventing the admission of atmospheric air. Creosote, oil of cloves, or carbolic acid may also be applied to the wound, if thought necessary. Lock-jaw occasionally follows this injury.

PLATE X



DISLOCATION OF PATELLA, OR STIFLE



163. **Stifle-Joint.**—Independent of the disease of the bones that enter into the formation of this joint (*par. 113*), the soft structures in connexion with it are frequently the seat of injury and disease. Some breeds of horses are more susceptible to contract diseases and enlargements of this joint than others. Young animals—more particularly of the cart-horse class—are subject to big or distended joints, known as '*stifled*,' or **luxation of the patella** (*Plate IX., No. 30*).

164. **Luxation of the Patella** is a partial displacement of the cap of the stifle joint, and is of a hereditary nature. The young animals, which suffer, as a rule, are very poor, and bad thrivers; and when they stir or walk about, the patella, or cap, slips partly off the joint towards the outside, making a knocking noise. Very hilly pastures are thought to favour the development of the trouble in young horses. The treatment consists of repeated blistering, which sometimes does good, and putting on of a special shoe, thin at the heels, but with a thick projecting toe. But so unsatisfactory, as a rule, are the various forms of treatment that the best plan is to destroy the animal, as it scarcely pays to bring it up for work, and it is of no good to breed from.

165. **Dislocation of the Patella** is a displacement of the patella or cap of the stifle joint. Horses and cows sometimes throw off the cap by jumping up too suddenly. When dislocation takes place, the cap comes to the outside, on account of the ridge on the femur being less on the outside than on the inside. The leg is extended behind in a rigid condition, the front of the point of the toe resting on the ground with the sole of the foot looking upwards and backwards (*Plate X.*). If in the stall, the animal must be got into the yard, a neck-collar put on, and a strong rope passed through the bottom of the collar, between the fore-legs, and tied round the pastern joint of the dislocated limb. The foot must then be pulled forcibly forward under the belly until the sole can rest flat on the ground; the cap must now be manipulated to the front and held there, when, on the horse stepping forward, it readily drops into its place. A good blister should be applied, and the animal tied up short for a week or



so to prevent it lying down, as, when once the cap has been disturbed and ligaments stretched, it is apt to again become displaced.

166. **Hip-Joint Dislocation.**—From some extensive injury this joint occasionally becomes dislocated, being usually accompanied by a fracture. The leg seems much shorter than its fellow, and does not reach the ground. When the dislocation is forward, in front of the articulation, the back of the leg hangs, pressing against the front of the shank bone of the opposite leg, and when the dislocation is backward, the front of the leg presses against the back of the shank of its fellow. When the muscles are so extensively lacerated, and the swelling is great, the animal is usually destroyed.

## LECTURE IV

### THE HORSE'S FOOT: SHOEING, ETC.

167. THE horse's foot is made up of soft and hard structures of a **sensitive** and **non-sensitive** nature. The external horny covering or **hoof** is *non-sensitive*, and is made up of the **wall** or **crust** and **bars**, **sole**, **frog**, and **frog band**.

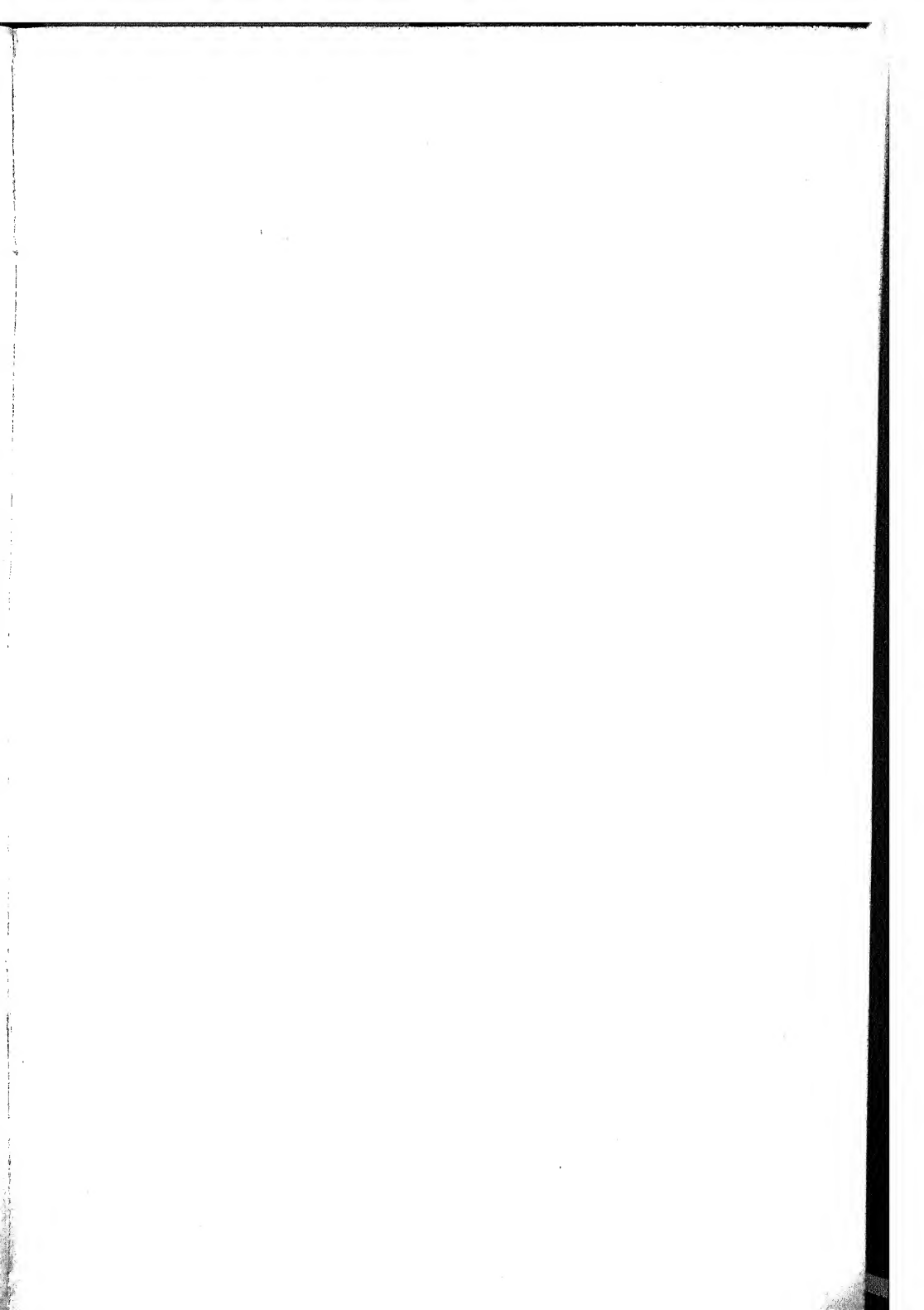
168. **The Wall** (*Plate XII., No. 2, F*) is that portion seen when the foot is placed flat on the ground, and is divided into **toe**, **quarters**, and **heels**; at the latter it turns inwards, and forms the **bars**, which run on each side of the frog, on the ground surface, towards the toe. The wall is thickest at the toe, becoming thinner as it reaches the quarters; while the outside quarter, or *spread*, of the foot is more rounded than the inside, which is nearly straight up. The fore-foot is more of an oval shape at the toe than the hind one, which is oblong, pointed, and straighter up. The wall is said to contain about 25 per cent. of moisture, and externally has a smooth, fibrous-like appearance. These so-called fibres are, in reality, small horny tubes, filled with and matted together by a gelatinous matter; they run from the top of the hoof to the bottom in an oblique manner, and are secreted from the blood by the action of the **coronary band**, or cushion (*Plate XII., No. 3, K K*), which lies in the hollow groove running round *the top and inside of the hoof*. The **perioplic ring**, or **frog band** (*Plate XII., No. 2, G*), is a light-coloured, soft, horny-like structure, which runs round *the top and outside of the foot*, at the junction of the hoof and skin, and becomes blended with the bulbs of the frog. It is best seen when the foot is wet, and is thought to have a protective influ-

ence on the newly-secreted horn, and should never be destroyed by the rasp. The internal portion of the wall is a leaf-like, or **laminated**, structure, which dovetails into the sensitive laminae surrounding the coffin bone. It has been estimated that there are between 500 and 600 of these non-sensitive horny laminae and a like number of sensitive ones, each being again studded with about 100 secondary ones, like the barbs of a feather, making the dovetail more complete. These give a surface to the foot, estimated to be equivalent to 8 square feet, or a total area for the 4 feet of 32 square feet.

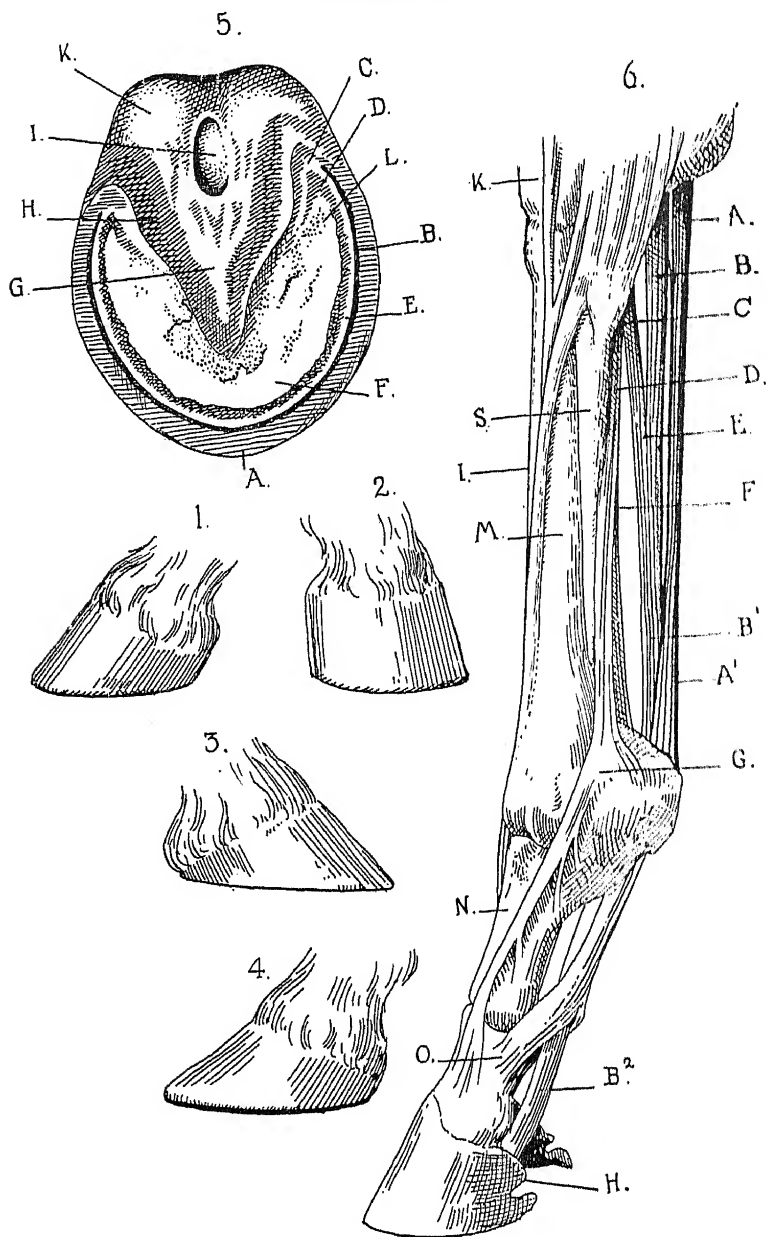
169. **The Sole** (*Plate XI., No. 5, F*) is the under or ground portion of the hoof, and is slightly concave, filling up the space between the **bars** (*Plate XI., No. 5, D*) and the ground surface of the **crust** or wall. On the ground surface a white rim is seen, called the '**white line**,' which marks the union of the sole with the wall (*Plate XI., No. 5, E*). The sole consists of thin plates of horny material, which flake or fall off successively, when they have done their work, at the ground surface. The internal surface presents a sort of very fine honeycombed appearance, with little depressions, into which dip the papillae of the sensitive sole, and by which the horny matter is secreted. The sole is supposed to contain about 37 per cent. of moisture.

170. **The Frog** (*Plate XI., No. 5, G*) is the triangular elastic pad of horn, containing about 43 per cent. of moisture, fitting into the space between the bars. It runs to a point towards the toe, and at the back forms the **bulbs** (*Plate XI., No. 5, K*) of the heels. The deep cavities between the frog and the bars are called **commissures** (*Plate XI., No. 5, H*) of the frog. Along the middle of the ground surface runs the **cleft** (*Plate XI., No. 5, I*), corresponding to an elevation on the internal surface, which is called the **frog-stay** (*Plate XII., No. 2, M*), and is attached to the fatty frog or sensitive cushion.

171. **The Sensitive Structures** of the foot are : (1) *The coronary band* ; (2) *the sensitive laminae* ; (3) *the sensitive sole* ; (4) *the fatty frog* ; (5) *tendons and ligaments* ; (6) *bones and cartilages*—all of which are



# PLATE XI



## EXPLANATION OF PLATE XI

1, 2, 3, 4. Varieties of Feet, pp. 96 and 97, *par.* 176.

### 5. Sole of Hoof.

- A. Ground Surface of the Wall at the Toe.
- B. Ground Surface of the Wall at the Quarter.
- C. Ground Surface of the Wall at the Heels, where it turns and forms the Bars.
- D. The Bar.
- E. White Line or Junction of the Wall and the Sole.
- F. The Sole.
- G. The Frog.
- H. The Commissures.
- I. The Cleft of the Frog.
- K. The Bulb of the Heel.
- L. Seat of Corn.

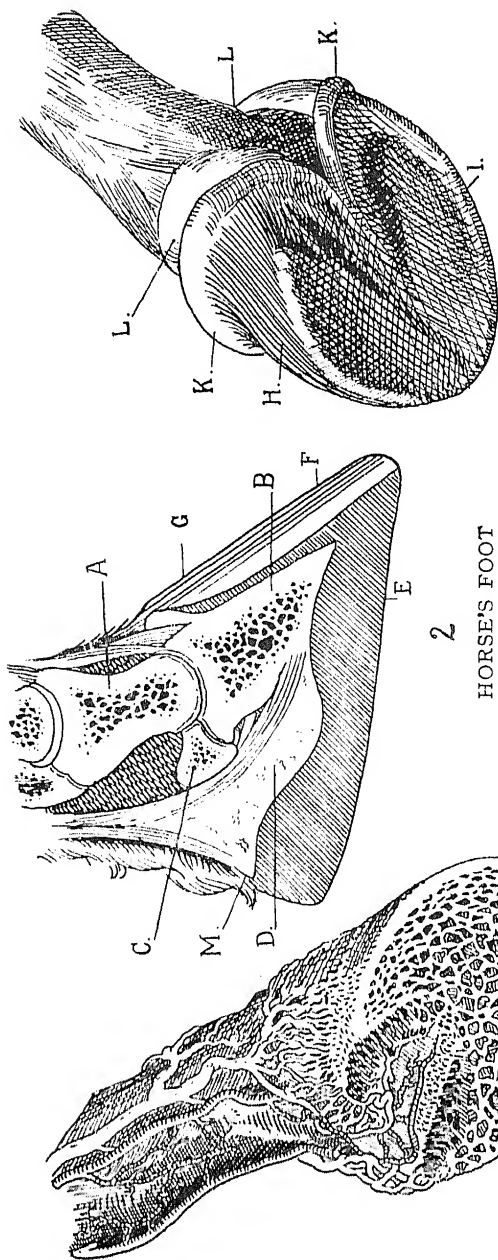
### 6. Fore-leg from Knee, Showing Bones, Tendons, and Ligaments.

- A. Flexor Perforatus.
- A<sup>1</sup>. Flexor Perforatus.
- B. Flexor Perforans.
- B<sup>1</sup>. Flexor Perforans.
- B<sup>2</sup>. Flexor Perforans.
- C. Metacarpal Ligament.
- D. Suspensory Ligament.
- E. Insertion of Metacarpal Ligament into Perforans.
- F. Bifurcation of Suspensory Ligament.
- G. Continuation of Suspensory Ligament.
- H. Coffin Bone.
- I. Extensor Tendon.
- K. Knee.
- M. Metacarpal Bone.
- N. Os Suffraginis (Large Pastern).
- O. Os Coronæ (Small Pastern).
- S. Splint Bone.

highly supplied with bloodvessels and nerves. The **coronary band** (*Plate XII., No. 3, K K*) is situated in the hollow or semicircular groove which runs round the top and inner aspect of the hoof, and is attached to the true skin by its upper margin, while the under portion is covered with minute sprout-like projections (*papillæ*), which dip into the small orifices of the wall and secrete the horn fibres. The **sensitive laminæ**, or **leaves** (*Plate XII., No. 3, H*), correspond in number to those of the non-sensitive or horny laminæ seen on the inside of the wall of the hoof, to which they are firmly attached. The sensitive laminæ surround the bony structures of the foot, to which they are connected by dense connective tissue, and they assist in the secretion of horn. The **sensitive sole** (*Plate XII., No. 3, I*) is attached to the bottom of the coffin or pedal bone, and the under surface next to the horny sole resembles a piece of fine velvet, being covered with small projecting *papillæ*, which not only secretes the horn, but also gives attachment to the non-sensitive sole. The **sensitive frog** (*Plate XII., No. 2, D*), sometimes called the fatty frog, is situated at the back part of the foot, and lies between the wings of the coffin bone, above the horny frog; it acts as a cushion by supporting the weight in progression (*Side-Bones, par. 192*). The **tendons** found in the foot are the terminal point of the extensor and flexor muscles of the limb, and the **ligaments** are those in connexion with the foot (*Plate XII., Nos. 1, 2, and 3*).

172. In the **Foot** there are **Three Bones**: (1) The **coffin** or **pedal bone** (*Plate XII., No. 2, B*). This bone is crescent-shaped, the body resembling the front of the hoof, with an elevation in front at the top. The two quarters or wings run backwards on each side, to which are attached the **lateral cartilages** (*Plate XII., No. 3, L L*), that so often in cart-horses become ossified and form **side-bones**. The bone itself is very porous in structure, and contains numerous fissures, thus allowing the ramification of nerves, bloodvessels, etc. (2) The **coronary**, or **short pastern bone** (*Plate XII., No. 2, A*), which is situated above the coffin bone, forming with it a joint, into the formation of which also enters—(3) the **navicular**, or **shuttle bone**

# PLATE XII



1

1. The Foot with Skin and Hoof removed, showing Arteries and Veins ramifying to form a beautiful network.

## HORSE'S FOOT

2

2. Foot sawn through the middle.  
 A. Coronet Bone, or Small Pastern.  
 B. Coffin or Pedal Bone.  
 C. Navicular or Shuttle Bone.  
 D. Sensitive or Fatty Frog.  
 E. Non-sensitive or Horny Sole.  
 F. Non-sensitive or Horny Wall.  
 G. The Periopic Ring, or Frog Band.  
 M. Frog Stay.

3

3. Foot without Hoof.  
 H. Sensitive Laminae.  
 I. Sensitive Sole.  
 K K. Coronary Band.  
 L L. Lateral Cartilage.





(*Plate XII., No. 2, C*), which, just behind the coffin bone, acts as a fulcrum for the tendon passing over it.

173. **Historical.**—In paleolithic ages there is evidence to show that the horse was an object of the chase and a source of food. In neolithic remains representations of it appear, but still, apparently, only as a creature of the chase. It is first known to have been domesticated by the Egyptians, but not until a late period; at least, no evidence of its having been domesticated can be gathered from the earlier monuments. In the Old Testament (in which the first mention occurs in Gen. xlvii. 17, when Joseph gave his brethren bread in return for horses, etc.) the horse is chiefly referred to in connexion with warfare. In the Book of Job (xxxix.) the war-horse is described as rejoicing in his strength and smelling the battle afar off. Horses, horsemen, and chariots, and trading in horses, are referred to in many places—*e.g.*, 2 Kings xviii. 23; Ezek. xxvii. 14; Zech. vi. 2, 3—thus showing the general usefulness of the horse to mankind. Even in the earliest ages man's attention had been drawn to the brittle nature of the horse's hoof, for in Judg. v. 22 we find it stated that, 'Then were the horsehoofs broken by the means of their pransings.' In the ancient Greek and Roman journals, also, we find that armies had to be disbanded in consequence of the horses' hoofs breaking and wearing; while Suetonius and Pliny, as well as other historians, specially record the horses' frequent incapacity to do work from the wearing of the hoof. The exact time, however, when shoes were applied to horses' feet is not known, but the Persians get the credit of being the first to use them. In a Mosaic painting of Pompeii a shoe is noticed on the foot of the war-horse of Satrapes—333 B.C. In the year 1653 an iron shoe was found in the tomb of Childeric, King of France, who died A.D. 481, and William the Conqueror is credited with having introduced the art of shoeing into this country.

174. The horse's hoof has been a subject of deep study for centuries; and I know of no mechanical contrivance which the mind of man can contemplate with greater wonder and admiration. If there is one thing more than another which has a tendency to encourage

and advance 'science with practice' it is the art of 'horse-shoeing.' For the shoer to have a knowledge of the different forms or kinds of feet, to frame the various kinds of shoes and attach them properly, and then to give a reason for his work, would be, I think, one of the finest examples of 'science and practice.'

175. The horse in its native wilds or at grass seldom has any need of protection for the foot, but the condition of our roads and streets is such that it is necessary to protect this beautiful structure from injury; therefore shoeing becomes a necessity, requiring science and practice for its proper application; and, owing to the great variety of feet met with in the different breeds of horses, and the peculiar formation of some of the hoofs, horse-shoeing (with brains as well as with the hands) is actually of much more importance than it is usually credited with. What is the use of a horse, however good or well-fashioned, if it has not a sound foot to stand upon?

176. **Varieties of Feet.**—Among the different types of feet the following are here noticed:

- (1) **Sound Feet.**—That which is called a **good, strong, sound foot** has its front wall inclined at an angle of from 45 to 50 degrees, and has the outside wall more rounded than the inner, which is nearly straight up and down, and has a good concave sole. Although the feet vary in colour, a bluish-grey has the preference (*Plate XI., No. 1*).
- (2) **Narrow Feet.**—The next type is similar to the first, only the heels are much higher, and the quarters and toe more upright. Feet of this kind, although serviceable, are, in light-legged horses, liable to contraction and **navicular disease**, while in cart-horses they are most subject to **side-bones**. The walls and soles are generally strong and hard, but this type requires a great amount of care in shoeing (*Plate XI., No. 2*).
- (3) **Flat Feet.**—Some classes of cart and harness horses have **great flat feet**, with very **large frogs**, and open, low,

**weak heels** (showing that when the frog meets the ground pressure the feet expand at the back), and the sole, as a rule, instead of being concave, is flat. Horses with feet of this kind are certainly useful, but they are best on farms. Such feet are frequently affected with corns and bruises, and are at times troublesome to shoe (*Plate XI., No. 3*).

- (4) **Dished Feet**, or feet with **hollow walls and rounded (convex) pumiced soles**, are somewhat similar to the last, but more pronounced, and are more prone to bruises and disease than any other kind of feet, requiring very careful shoeing, with a shoe well seated on the upper surface next the sole (*Plate XI., No. 4*).

- (5) **Odd Feet**.—Curiously enough, these are often seen in race-horses, and, although one is smaller than the other, there is no disease, and the small foot stands as much wear and tear as its larger mate. These feet generally resemble varieties Nos. 1 and 2, *Plate XI*. A horse's feet, however, may become of different sizes by frequently pulling the shoe off one of them, which is done by the animal galloping round in a circle, the inside fore shoe being apt to be clicked off by the hind one on the same side; and each time the shoe is replaced the foot decreases in size; still, there is no disease. But the foot may also become smaller from disease.

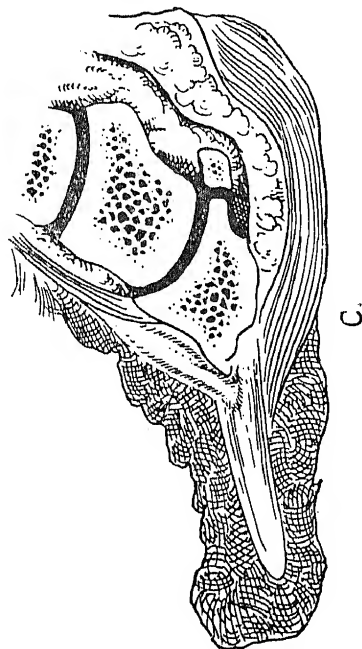
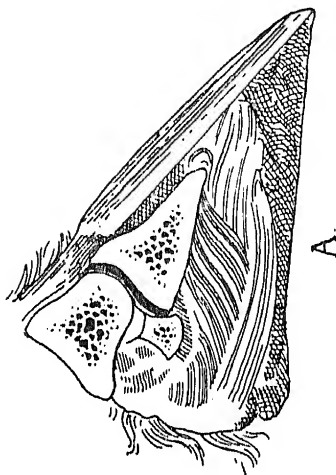
177. **Different Kinds of Shoes** are required, according to the kind or breed of horse, and the work it has to do :

- (1) **Race-horses** require only a very narrow plate, covering the ground surface of the wall, and but slightly overlapping the junction between the sole and wall, or **white line** (*Plate XV., 1 A and 1 B.*) The **French** or **Charlier** system meets these requirements. In this form of shoeing, a groove is made

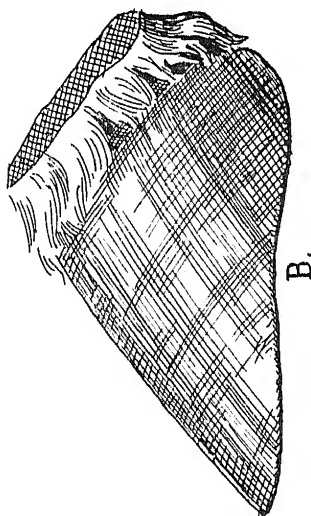
round the ground surface of the wall, into which the shoe is fitted, there being no covering on the sole. It certainly gives the frog full play, but does not answer for animals in use on macadamized roads and paved streets.

- (2) **Hunters** are generally shod with a broader web, having a flat face next the sole, which it slightly covers (giving support to the connexion of the wall with the sole), well seated, and grooved on the ground surface, imitating, as far as possible, the bottom of the foot, so as to get a better grip of the ground (*Plate XV., 2 A and 2 B*).
- (3) **Hackneys and Carriage-Horses.**—A shoe is generally adopted that is well seated on the upper surface, next the sole, with a good flat level bearing at the heels, and round the bottom surface of the wall (*Plate XV., Nos. 3 and 2 B*); but for a good foot (*as Nos. 1 or 2, par. 176*), a shoe prepared on the lines of the hunter's shoe is to be preferred.
- (4) **Cart and Waggon Horses** have shoes made similar to those for carriage-horses, but much heavier and broader, being seated on the surface next the foot. They are generally turned up at the heels (caulkings), and have a toe-piece (*Plate XV., 4 A and 4 B*). This turning up of the heel, more particularly in dealing with a young horse, is a great mistake. It should be shod flat, as the heels lift the foot from its centre of bearing, and the frog is taken away from its proper work. This is fully explained under **Side-Bones** (*par. 192*).
- (5) **Bar Shoes** are used for weak-heeled horses, or where damage has been done to the quarters. They give additional support and pressure to the frog and relieve side-bones and corns (*Plate XV., No. 5*).

PLATE XIII



A. Section of Overgrown Hoof.  
C. Section of Laminitic Foot.



B. Side-View of Overgrown Hoof.  
D. Side-View of Laminitic Foot.



- (6) **Round or Rocker Shoes** are something analogous to bar shoes. They are very useful for weak feet, and also in cases where there has been extensive inflammation—**laminitis**. Their ground surface is formed in the shape of a rocker, thin at heel and toe and thick at the quarter, so that when the horse puts its heel to the ground the foot rocks gently over, and the animal is assisted very much in progression (*Plate XV., No. 6*).
- (7) **Three-quarter Shoes**.—When we have disease of, or injury to, either outside or inside heels, as from corns, etc., a shoe is made with a bar to lie across the frog, while the side of the shoe next the damaged part is cut off to prevent pressure (*Plate XV., No. 7*).
- (8) **Diamond-toed Shoes** have diamond points, and are used on the hind-feet, to prevent the horse from 'forging' or 'clinking'—that is, where the toe of the hind shoe strikes the ground surface of the fore-foot shoe. A young horse, when first put to work, nearly always acquires this habit of 'hammer and pincers,' as it is commonly called, but as it gets into step, this in time leaves it (*Plate XV., No. 8*).
- (9) **Feather-edged Shoes**.—These are preventive shoes, and are more frequently used on the hind than on the fore feet. They are used for animals that buff themselves by striking the fetlock joint or shank on the inner side of the opposite leg. Some young horses are very subject to buffing, and for treatment of the bruises, see *par. 131*. The shoe is made with a feather-edge on the inside, tapering inwards, on the ground surface, towards the frog, nailed on the outside and round the toe. Indiarubber rings, leather pads, or boots, and woollen bandages, are also used to protect the opposite leg from further injury (*Plate XV., No. 9*).



178. In all cases where there is a **good, healthy, well-formed foot, with concave sole**, the surface of the shoe next the foot ought to be flat, so as to give a little pressure to the sole, and also to support the union of the wall with the sole. In weak, convex soles, however, the shoe should be seated so as to meet the requirements of the case.

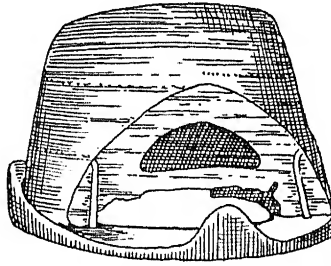
179. **Preparing the Foot for the Shoe.**—A young horse, when first brought in from grass, should be put into a loose, open shed for ten days or a fortnight before shoes are applied to the feet. The ground surface of the crust or wall of the foot should then be levelled with a rasp, to make a good bed for the shoe, which should invariably be a plain one, without the heels being turned up; and on no consideration must the shoe be applied too hot to the foot, for, although horn is a bad heat conductor, yet I have, on several occasions, seen founder (**laminitis**) produced through neglect of this caution. In future shoeing—*i.e.*, re-shoeing—the clinches ought to be carefully turned back, and, if possible, each nail drawn separately, thus preventing the crust being broken; the rasp may then be run gently round the sharp edges of the crust, and, as the foot always grows in length at the toe (*Plate XIII., Figs. A and B*) and very sparingly at the heels, it must be shortened. This is usually done by cutting a piece from the front of the wall, at the toe; but to this method I have great objections. The foot should be shortened by dressing down the ground surface from one quarter round the toe to the other. This, when properly done, gives a level bearing for the shoe, preventing pressure on the heels, without having to spring the heels of the shoe. In paring the sole, only the rough, loose flakes ought to be removed, except in **navicular** disease, where we have, from continued irritation, an overgrowth of horn, in which case *the sole must then be thinned* by paring the ground surface of the sole of the foot.

180. Farmers themselves are very much to blame in not paying more attention to their horses' feet. 'No foot, no horse'—that is to say, no matter how grand and good the animal may be otherwise, it is of very little account if it has not sound feet. Sometimes farmers

## PLATE XIV

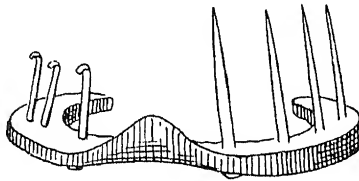
### SECTIONS OF HOOF AND SHOE

1.



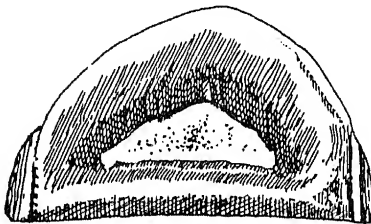
1. Section of Hoof, showing Position and Direction of the Two Front Nails

2.

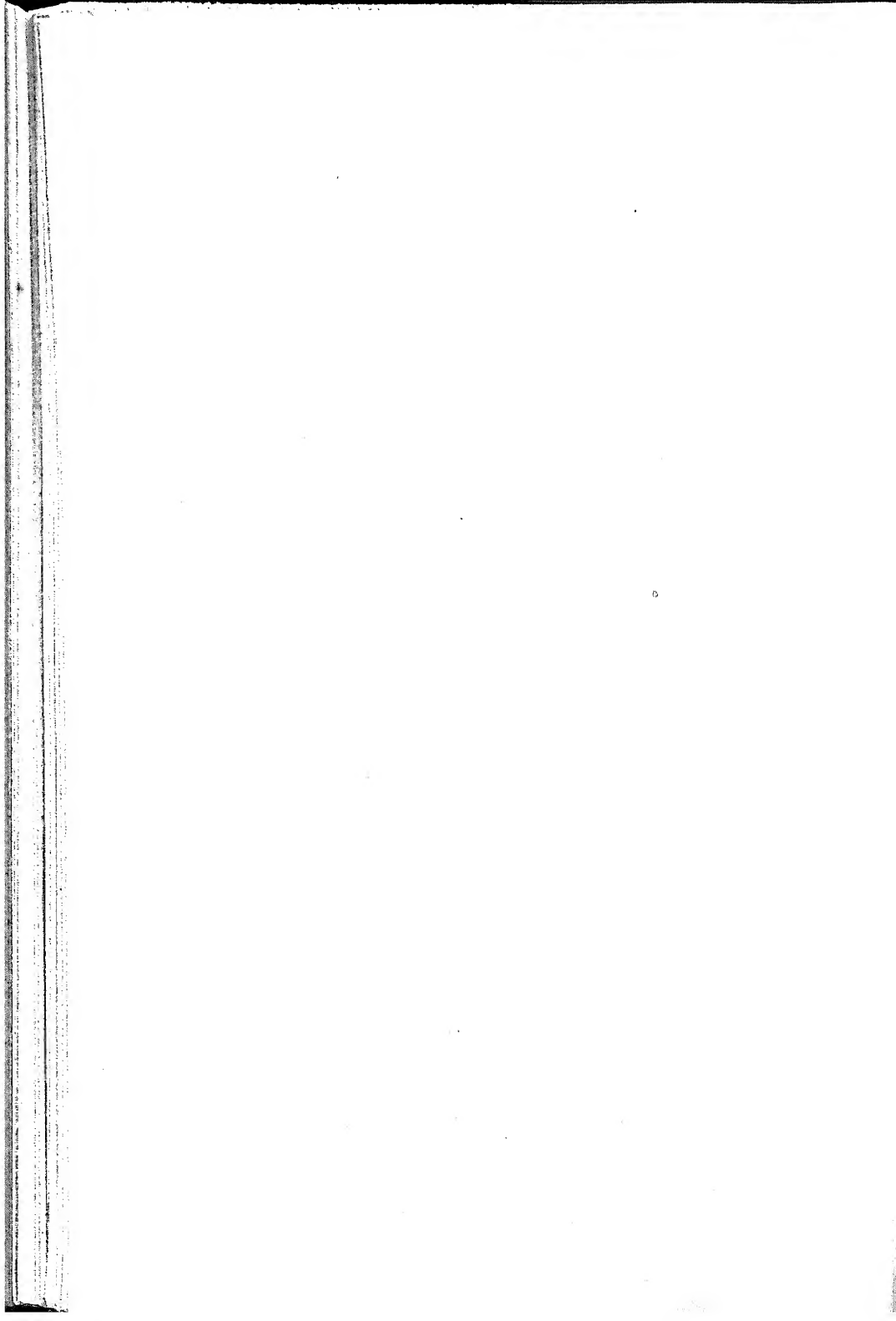


2. Shoe and Nails *in Situ* showing the Inward Direction of the Nails when driven into the Hoof. Right Side of Shoe showing Clinches turned over.

3.



3. Toe-Piece of No. 1, showing Marks of Nails.



allow a horse to go three or four months without being re-shod, by which time the feet are so overgrown and in such a state that it takes months to get them into form again. It would be much better to take the shoes off altogether, and then the foot, with use, would naturally wear away. Shoes are best removed once every four or six weeks, and should never, on any account, be allowed to remain longer than two months.

181. **Fitting the Shoe.**—Before the shoe is fitted the foot, in many cases, requires a certain amount of trimming; this should be done with care and judgment. Then the shoe should be made to fit level, and be a shade larger than the foot at the ground surface, continuing the angle of inclination of the wall of the hoof. As already said, it must not be applied too hot—just hot enough to make itself a firm bed; neither must it be nailed to fit, as this tears the hoof.

182. **Nails and Nail-Holes.**—The fewer nails there are in the shoe the better—but, as a rule, four nails are put on the outside and three on the inside; more are used at times, but if the shoe is efficiently fitted, even a less number may be sufficient. The nail-holes, whether punched through the racing or fullering, or stamped, are, as a rule, made so that the nails, when driven, have a decided inward bearing (*Plate XIV., Nos. 1, 2, and 3*), particularly at the toe so as to keep in line with the angle of the hoof, while the quarter and heel nails are more nearly vertical. When the holes are made too oblique, the nails are apt to break off at the neck. Some feet, however, are so constituted that the shoe has to be nailed round the toe instead of the quarter. In driving the nail, care should be taken not to get into the sensitive parts, nor to get so near as to press on them. This shows how necessary it is to fit the shoe properly, and, also, to make the nail-holes at proper angles. After the shoe has been attached, in dressing the hoof, some smiths persist in rasping the walls—‘to make them look nice,’ they say. To my eye, nothing looks worse than a rasped hoof. By the use of the rasp, not only is the outer covering, *periople*, or varnish-like structure of the hoof, destroyed, but some hundreds of the little fibrous tubes which are

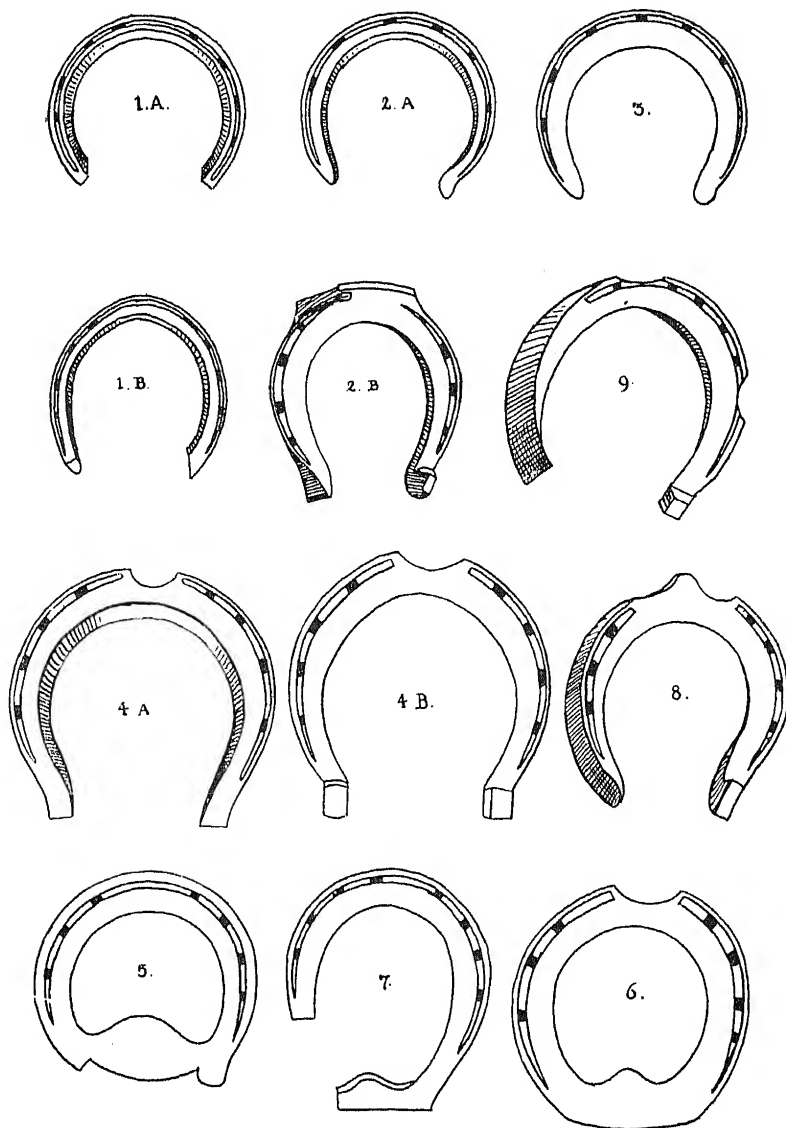
seen running from the top to the bottom of the hoof are wounded and left exposed to the action of the atmosphere, which makes the hoof turn hard and brittle, breaking off where the nails are turned down or clinched. I thus strongly say that the knife and rasp ought to be used sparingly and with great caution. *The hoof must not be rasped above the clinches on any account.*

183. **Stopping for the Feet.**—Numerous authorities do not favour stopping the feet with articles of a moist nature. I was my own groom for over twenty years, and as I did all my work on the saddle, I felt the full benefit of stopping the feet when the roads were hard and dry, for if the practice was omitted the want was readily noticed on mounting next morning. Therefore, in long-continued frosts, or during a spell of hot weather, where a horse is doing a lot of work on the hard dry road, and the moisture of the horn becomes exhausted, I am in favour of stopping the feet, to keep them cool, moist, and pliable. By referring to *pars. 168 to 170*, it will be seen how much moisture the different parts of the hoof contain, and these quantities should be maintained. I have never yet found anything for this purpose to beat cow-dung and clay in equal parts, stuffing the bottom of the feet with it each alternate night.

184. **Leather Soles** should not be used except in cases of injury, when they become necessary; for, to stimulate and preserve the healthy action of the hoof, air should be allowed free access to all parts. **Exercise** also is very essential, in order to keep both the outside and inside of the hoof in sound condition. Without it healthy circulation cannot be maintained in the foot, and the result is disease; therefore, if a horse cannot be taken out every day, it should be turned into a loose-box or paddock.

185. **Indiarubber Pads.**—In connexion with leather soles rubber pads are now made of various descriptions and sizes, and are found to answer well. The **rubber frog pad**, for example, is an artificial indiarubber frog, fixed on a leather sole, which is nailed on between the foot and the shoe, and is very useful for narrow-

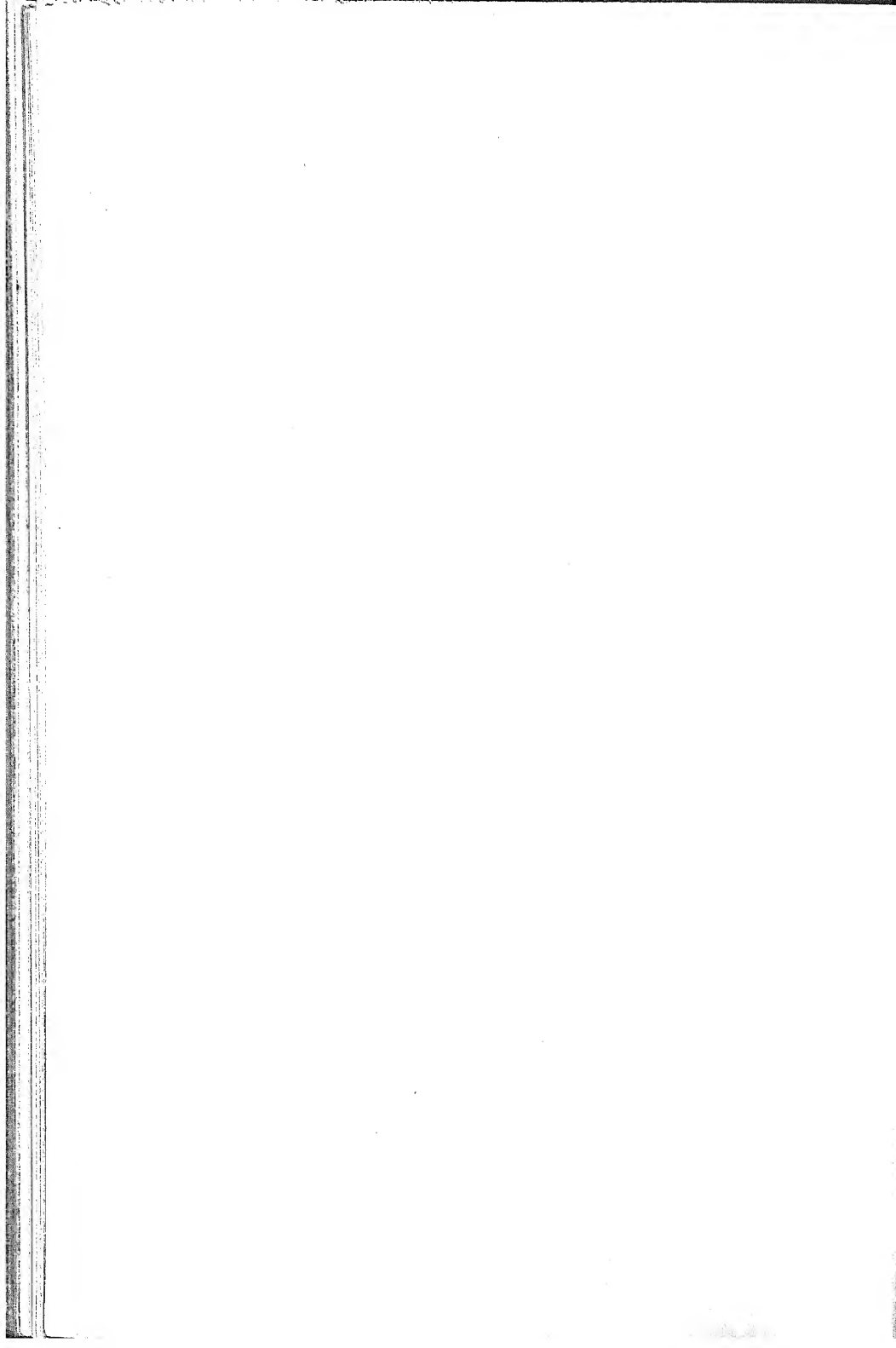
# PLATE XV



## HORSE-SHOES

- A. Signifies Fore-foot Shoe.
- B. Signifies Hind-foot Shoe.





heeled fore-feet and small or wasted frogs. **Anti-slipping pads** are also many, and one of them in common use is a sort of bag of indiarubber, in the shape of the foot, with a corrugated ground surface, and fixed within the inner rims of the shoe. The **frog bar pad** is another indiarubber pad, fixed on to a stout piece of leather, the rubber bar of which runs across the back part of the foot and covers both heels and frog, and is nailed to the foot above a short shoe. This is one of the best forms of pads, for, besides preventing slipping, it is of great service in the case of corns, weak heels, narrow or contracted quarters, navicular disease, and chronic laminitic feet.

186. For further particulars respecting the horse's foot and shoeing, Mr. William Hunting's 'Art of Horse-Shoeing' (third edition) is recommended.

### INJURIES TO, AND DISEASES OF, THE FOOT OF THE HORSE.

187. The foot of the horse is at all times very liable to injury and disease, and in all cases of lameness the foot should be examined to make sure that all is right there, even though the leg be broken. The diseases or injuries to which the feet of horses are most subject are *pricks, corns, quittor, side-bones, sandcrack, seedy toe, false quarter, thrush, canker, treads, overreaches, groggy lameness, and laminitis*.

188. **A Prick from Shoeing, or Otherwise.**—This is the most common injury to the foot. In shoeing, if a nail should unfortunately be driven into the sensitive part of the foot, the owner ought at once to be told of the misfortune. At the same time the shoe must be removed, and the foot put into an antiseptic bran-poultice, made with cold water and a little carbolic acid, and kept constantly wet for a few days, when the part generally heals without any bad effect. But as a rule the nail is withdrawn, and no mention is made of the matter, with the result that the horse is put to work and, in the course of two or three days, becomes lame. The injury may be detected by tapping the part with a hammer, or by removing the shoe and pressing the foot with a pair of pincers, the animal flinching when the injured part is touched. The sole must then be



carefully dressed away, following the black spot with the point of the shoeing-knife, when a dirty, thin, dark-coloured fluid will generally be met with (commonly called gravel) at the bottom of the nail-hole. If left alone too long, this fluid sometimes works under the sole, and, if not liberated, will find its way out at the top of the band of the hoof or at the bulbs of the heel. After the escape of the matter, the foot should be placed in a cold bran-poultice, to which a tablespoonful of carbolic acid, phenyl, or any good antiseptic, has been added, until all the inflammation has subsided; then, after dressing with tow and tar ointment (Sandcrack, *par.* 193), and protecting with a leather sole, the shoe may be put on. Sometimes the nails are driven too near, causing pressure on the sensitive parts and making the animal step short, or decidedly lame. Taking off the shoe and poulticing the foot for twenty-four hours is all that is necessary in such cases, for cutting into the parts does more harm than good.

189. When a horse drops suddenly lame on the road, the foot must at once be examined, to see whether it has been injured by a nail or a piece of wire. If this is found to be the case, remove the foreign body at once, and at the first house on the road wash the wound out by pouring hot water on to it, then heat the nail or piece of wire in the fire, and with a pair of pincers press it into the hole already made, thus cauterizing the wound; a little hard soap may then be pressed into the hole, after which, as a rule, no further trouble arises; but should the animal become lame afterwards, take off the shoe and poultice the foot, as already stated. **Pricks** from nails are very dangerous, and should receive prompt attention, as **tetanus** (lock-jaw) often arises from a simple prick in the foot; yet, strange to say, at the bottom of a coal-pit—where wounds in the feet, from gathered nails, are of frequent occurrence—lock-jaw is rarely or never seen.

190. **Corns** are recognized by a blood-red stain in the horn, and are caused by a bruise or injury, with subsequent infiltration of blood through the pores of the horn. They occur chiefly in flat-footed, weak-heeled horses, and are generally found in the fore-feet, principally in the *inner* corner of the heels, between the wall and

bars (*Plate XI., No. 5 L.*). Hunters are great sufferers from this class of injury, owing to their being shod with short-heeled shoes. Corns are very common, and as they are looked upon as unsoundness, in all cases of examination the shoes should be removed, and the feet carefully searched. When they cause lameness, the shoe should be removed, and the parts dressed out; particularly if the bar is too strong, and doubled over, and pressing on the sole, for it must then be pared away, so as to remove all pressure from the part. At times matter is also formed which must be liberated. In bad cases poultices have to be applied to reduce the inflammation, and a three-quarter or bar shoe (*Plate XV., Nos. 5 and 7*) is found to be necessary; while the indiarubber bar pad is also of great service. If neglected, the inflammation extends to the internal parts of the foot, when pus or matter forms, and finds its way out at the top of the hoof, causing much pain and suffering to the animal, and perhaps ending in quittor.

191. **Quittor** is a fistulous disease of the foot, of a most painful and troublesome nature. Injuries of any description to the foot may end in quittor. It is not often seen in the country, but in towns it is very common. Railway horses are very subject to it, owing to getting their feet fixed in the rails and waggons or carts passing over them. The structure of the foot becomes so much implicated that the bone and cartilage become diseased, when holes, or sinuses, are formed at the quarter and round the band of the hoof. At first cold water poultices may be of some service in reducing the active inflammation, but when the disease has become chronic, blisters, caustic dressings, and the hot iron have to be applied; while, as a last resource, an operation has to be performed by which the diseased bone and cartilage are removed, making the complicated sores into one simple wound. These cases are much too formidable for the attempts of an amateur.

192. **Side-Bones** consist of the ossification of one or both of the *lateral cartilages*, which are situated at the sides and top of the hoof. (*Plate VII., Nos. 7 and 8.*) They are met with in the forefeet, particularly in those cart-horses which have strong, upright

quarters ; but they are very rarely found in flat-footed horses, hacks, or carriage-horses. The principal causes are hereditary predisposition, injuries of various kinds, overreaches, chafing against the sharp edge of a lea-furrow, etc. ; but, in my opinion, the greatest evil of all is the use of high-heeled shoes, removing the frog from its ground pressure, thus throwing the weight on the lateral cartilages. Above the horny or *insensitive frog* there are elastic fibres running from the inside of one lateral cartilage to the inside of the other, forming what is called the *fatty* or *sensitive frog*, into which is inserted the *frogstay*, or elevation corresponding to the cleft in the middle of the ground surface of the frog. Now, when the weight of a horse is thrown on its foot, the pastern descends, the lateral cartilages yield and bend outwards at the top of the hoof, about the middle of the cartilage, whilst the top of the cartilage bends over and inwards, acting like a spring, letting the weight of the limb gently down on to the fatty frog, which, in turn, presses on the insensitive horny frog, bringing it in contact with the ground, and thus preventing concussion. But when a horse is shod with high or turned-up heels the horny frog becomes displaced, as it were, and thrown out of work, and all the weight is put on to the lateral cartilages, which, in time, through having all their own work, as well as that of the frog, to do, become ossified, and form side-bones (once side-bones, always side-bones), and this process may go on without any inconvenience or lameness. Shoeing-smiths — particularly those in the country — have the very great fault of cutting away the sides of the horny frog, yet it ought never to be touched. When side-bones cause lameness, remove the shoe, and apply cold water poultices until the inflammation and pain has abated, then ease the shoe or substitute a bar shoe (*Plate XV., No. 5*) ; this removes the pressure from the quarters, and throws weight on the frog. In a great proportion of cases no lameness is observed, and although the animals step short, yet they can do their work with little or no inconvenience ; nevertheless, they are always considered as unsound. One or both sides of the foot may be affected with side-bone. When they are very large, and cause much lameness, the hoof is cut through, with a special saw, at the quarter,

from top to bottom, in two places, just below and at either side of the side-bone; then, with a special shoeing-knife, the sole is divided from the crust *at the white line*, at the bottom of the foot, when the piece becomes partially loose, and, on the horse putting its weight on the foot, the saw-cuts spring open, and have to be filled in with beeswax. A bar shoe is then put on, a blister applied to the band of the hoof, and in a few months the foot expands and the horse goes sound.

193. **Sandcrack** is a fissure, rent, or separation of the horny, fibrous tubes of the hoof to a greater or less extent. It is more common in the town than in the country, occurring most frequently on the inner quarters of the fore-feet, and at times extending from the top of the hoof to the bottom. When slight, it causes little or no inconvenience; but when the fissure extends into the sensitive parts, and any dirt gets in, inflammation sets up, and matter or pus is formed. This must be liberated by cutting each side of the crack, dressing with carbolic oil, and applying poultices; after getting rid of this, a nick should be made with a hot fire-iron across the top of the crack through the horn, or in the shape of an inverted v (thus  $\wedge$ ) close against the hair, and the fissure dressed with tar ointment and tow (*par.* 1072). Then a tarred rope may be wound round the hoof, or a leather strap used, or even, in some cases, a specially constructed clasp may be advisable. The shoe must be eased below the crack, while cold water cloths or swabs, put round the hoof every night, have the best effect of anything that I know of in making the hoof grow. To counteract the brittle nature of the hoof, a mixture of one part of green tar and three parts hard fat or palm oil melted together, and applied round the top of the hoof twice a week, will also be found to answer admirably. A great many writers are against this application, but, from my own experience, I recommend its use.

194. **Seedy Toe**.—A morbid secretion of the sensitive laminæ, inducing the formation of degenerate horn (which has a crumbling, sawdust appearance, or, when moist, is of a cheese-like nature), and causing a separation of the laminæ from the outer wall of the hoof, along with, when extensive, a bulging out of the wall at the part.

It is due to some injury done to the foot—such as laminitis, or too much pressure by the clip of the shoe—and is mostly found at the toe of the fore-foot, but may occur at other parts of the hoof as well. The hind-foot may also be affected. When seedy toe is suspected, the shoe should be removed, and all the degenerate horn cleared out with a fine-pointed shoeing-knife; then some stimulating dressing should be applied, nothing being better than the tar ointment recommended for sandcrack (*par.* 193). Tar by itself must never be used, as it is too stimulating, and causes a crumbling of the horn. In examination for soundness the shoe should be taken off, as the morbid horn can only be found on the removal of the shoe.

195. **False Quarter** is known by a thin layer of modified brittle horn on the hoof, chiefly on the sides, when the parts are constricted, and form, where it is connected to the ordinary horny hoof, rifts or furrows (resembling sandcracks) on each side; and at times it may overlap the normal part, and is the result of some extensive damage done to the coronary band, or horn-secreting body, from such as stabs, treads, quittor, etc. A horse with false quarter may work equally as well as one with a good sound foot, and without showing signs of lameness if properly shod; but great care is, however, necessary in shoeing.

196. **Thrush** is the term applied to a fœtid discharge from the cleft of the frog, varying in character. Some formations of feet are more prone to this than others. It is generally produced by the animal standing in a wet, filthy stable or box, and can exist without causing any lameness whatever; in fact, I cannot call to mind a single case of lameness that could be attributed to thrush. If neglected, however, it may run on until it implicates the sensitive parts and destroys the healthy growth of horn. A change on to good dry bedding in the first instance, bathing the parts nightly with salt-and-water, and dressing with equal parts of iodoform and charcoal mixed—or a little calomel—and pressed into the bottom of the frog cleft with a flat stick will generally have the desired effect. Neglected thrush may run on into that formidable disease called canker.

197. **Canker** is a morbid fungoid growth of horn at the bottom of the foot, implicating the sensitive sole and frog. It may be produced by injuries, also by standing in a filthy, wet stable or box, etc., greasy-legged horses being very prone to it. Instead of the ordinary horn, little soft, spongy, sprouting growths, of a greyish-white appearance, are seen, which bleed on the slightest touch. It is usually first noticed in the commissures involving the bars and frog, and it may extend all over the sole, and affect one or more feet, but it seldom causes much lameness. Being of a very formidable nature, it is very difficult to treat, and should never be tampered with by amateurs. The animal must at once be put into a dry box, as moisture encourages the spongy growths, which develop rapidly. I have been most successful with daily dressings of powdered alum and dry tow, kept in place by a thin plate of iron screwed on to a special shoe, at the same time placing the animal on dry engine ashes instead of straw, and promptly removing all wet matters, such as fæces, urine, etc., as soon as evacuated or observed.

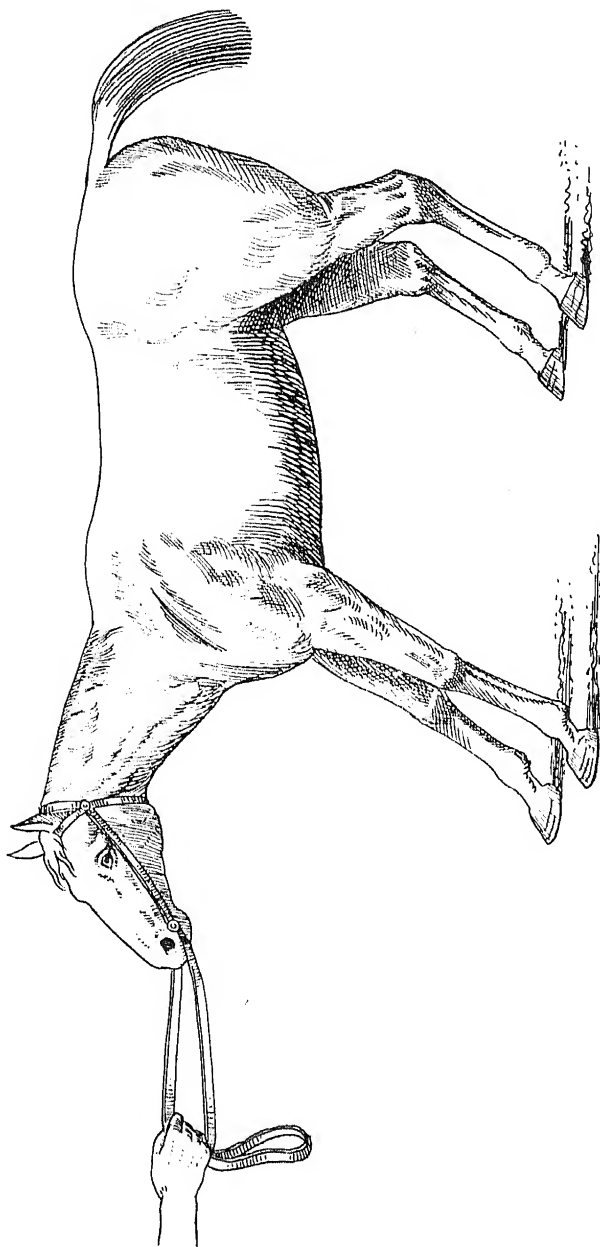
198. **Treads and Overreaches** are injuries done to the top of the foot and caused by the hind-foot overreaching on to the heel or quarter of the fore-foot, or by one foot treading on its fellow. Washing the parts well with clean cold water, removing all jagged edges of the wound with a pair of sharp scissors, and dressing with carbolized oil, will be found to answer in ordinary cases. Should the underlying parts be damaged, and the animal go tenderly and show pain, cold water cloths or poultices must be applied until the inflammation is reduced.

199. **Navicular Disease**, commonly called **groggy lameness**, may be defined as inflammation and ulceration of the tendinous or inferior articular surface of the navicular or shuttle bone, situated at the back of the coffin or pedal joint; or it may be produced by laceration of the fibres of the tendons passing over the bone to its insertion in the floor of the coffin bone, setting up inflammation and adhesion of the parts. It invariably occurs in the fore-feet, affecting chiefly horses of the light-legged class, and is in many cases due to hereditary

causes. Injury from fast work, on hard roads, is another frequent cause, but by far the most common cause is keeping horses in the stable day after day without exercise, then, on taking them out, giving them too much quick travelling, thus lacerating the tendon and setting up inflammation. Generally, the first symptom noticed is the horse pointing first one foot and then the other—that is, if both are affected—so as to ease the tendon as it passes over the acute angle of the bone; but this pointing must be confirmed by other symptoms. When brought out of the stable, the animal affected digs the point of the toe into the ground, stepping in a short and stilty manner until it gets warmed up, when it goes fairly well. The shoe is also much worn away at the toe, and, as a rule, the feet are very strong, high-heeled, and *contracted* (*Plate XI., No. 2*). Owing to the constant irritation within the foot, there is an extra growth of horn, giving a box-like appearance to the hoof. The disease is never *cured*, yet an animal can be made to do a great amount of work by careful attention to the feet, such as frequent shoeing, shortening the toe, and dressing the sole thin to relieve pressure, thus removing the overgrowth of horn, and by shoeing with the indiarubber bar pad and short shoe. Further, applying cold water swabs nightly round the feet, and turning the animal into a loose-box, instead of allowing it to stand in the stall, also gives relief. Blistering, frog setons, and unnerving are also useful, but, as above stated, the disease is never cured. As a preventive, however, never allow the animal to stand in a stall for days without exercise. If this cannot be given, turn it into a loose-box.

200. **Laminitis**—inflammation of the sensitive laminæ of the feet, commonly called **founder**. The disease, which more frequently affects the fore than the hind feet, is a very formidable one. It has a great variety of causes, such as drinking cold water, standing in a draught, or getting too much oatmeal and water when the animal is heated; overfeeding with boiled wheat or Indian corn, or gorging with oats or potatoes; travelling on snow; galloping on a hard road; applying a too hot shoe to the foot when shoeing; the effects of too large a dose of physic; inflammation shifting from

PLATE XVI



HORSE WITH LAMINITIS (FOUNDER, OR INFLAMMATION OF THE FORE-FEET.





one part of the body to another (*metastasis*); the retention of the after-birth in mares after foaling, etc. It may be *acute*, *subacute*, or *chronic*. The **symptoms** noticeable are that the animal is very unwilling to stir, the body is thrown backwards, putting the weight on to the hind-legs, which are 'propped' well forward under the belly, while the fore-legs are extended well in front (*Plate XVI.*). It moves with great difficulty and reluctance, walking on its heels. In acute cases the breathing is heavy and hurried, perspiration rolls off the body, eyelids are red, nostrils distended, pulse *full* and *bounding*, and the animal stands persistently, rarely lying down. The *treatment* consists of placing the patient in a loose-box, removing the shoes, putting the feet into hot or cold water bran-poultices (cold for preference), which must be kept constantly wet, and moving the horse frequently round the box. The cause must also be ascertained. If from overfeeding, a pint of linseed oil should be given, while, in some cases, blood-letting is highly necessary and very beneficial. If from an overdose of physic, doses of carbonate of soda—1 ounce each—may be given in well-boiled thin oatmeal gruel two or three times a day. If retention of the cleansing is the cause, the membranes must be carefully removed, as the smallest piece of the after-birth left in the womb of the mare soon undergoes decomposition, and the septic material is readily absorbed and carried through the system, and in many cases induces laminitis of a septic character; therefore the womb must be washed out by means of an injection of 6 quarts of tepid water, containing 1 ounce tincture of iron or some other antiseptic, while antiseptic medicine should be administered (*par. 1067, No. II.*). A dose of the prepared solution of **adrenalin** injected under the skin over the fetlock joints has been used with success. Finally, round rocker shoes, as described under Shoeing (*par. 177, No. 6; Plate XV., No. 6*), must be put on. At times, in severe cases of laminitis, the foot has to be opened at the toe to let out the effused material, as it is so great in some cases, especially those neglected at the first, that, if not liberated, it causes the sole to come down, producing great deformity of the foot. Founder is, therefore, by no means a fit case for an amateur to dabble with, and should have professional attendance from the first.

In severe cases of laminitis the foot becomes elongated at the toe, the point of the coffin bone is dislodged and drops down to the sole of the foot, and numerous irregular (*ribbed*) rings form round the hoof (*Plate XIII., C and D*). Rings, however, are also formed round the hoof from irregular nutrition, caused by frequently changing the animal from a grazing pasture to the stable, but these rings are more regular, and are seen on all the four feet.

## INJURIES TO, AND DISEASES OF, THE FEET OF THE COW, SHEEP, DOG, AND FIG.

### COW.

201. **The Foot of the Cow**, like that of the horse, is made up of *sensitive* and *non-sensitive* tissue; but, unlike that of the horse, it is '**cloven**'—i.e., divided into two sections, or toes, each containing three bones, thus showing six small bones in the foot, instead of three as in the horse. The non-sensitive or horny part is secreted and attached to the sensitive structures similarly to that of the horse, only the laminae and villi are much finer. The foot of the cow at the heel is deeper, more upright, stronger, and broader at the sole than the foot of the horse, while the claws are pointed and twist slightly towards each other. The **wall** is convex on the outer part, and at the toe makes a very acute and strong turn inwards, and runs back in wavy lines on the inner aspect of the claw, where it is met by the portion winding round the heel, to which it is united by a section of horn springing up from the sole; this is well defined in the foot of the sheep. The **horny sole** is flatter and smoother than in that of the horse, and is partially overlapped at the heels by the wall. Unlike the horse, the cow has **no frog**.

202. The cow is not nearly so subject to disease of, or injury to, the foot as the horse. Great lameness is, however, often induced by foreign bodies, such as pieces of iron, slate, stone, wood, etc., getting between the digits, and nails, wire, and sharp bodies are frequently found in the sole of the foot. Therefore, in all cases of lameness the foot should be carefully washed and the sole scraped and examined, and if foreign bodies are met with they must be removed, and the

foot put into a cold water and bran poultice for a day or two, keeping the poultice moist by dashing cold water over it three or four times a day.

203. **Foul in the Foot** consists of an irritative inflammation and ulceration between the digits, and is the most common foot affection in the cow, and usually caused by the animal standing in a filthy wet box or yard, or on soft, wet, marshy pastures; and although I have seen hundreds of cases, I have never yet met with one that could be said to arise from scrofulous or specific influence. There is acute lameness present, and the foot is swollen round the top of the hoof, and there is also a strong fœtid smell, with ulcerated sores of the soft tissues between the digits. The worst cases have been caused by rough treatment and the application of strong caustics, and I must here strongly condemn the barbarously cruel treatment of pulling a rough rope between the toes and applying butyr of antimony. This latter dressing burns and destroys the parts, bringing on what is termed '*bastard fouls*.' I have on many occasions seen the bones laid bare with such brutal treatment. Simple soothing applications are all that are necessary. The *treatment* for foul in the foot is very simple. The beast should be removed to a clean, thoroughly dry box, the parts washed with cold water containing phenyle or some disinfectant, and dressed with carbolic oil and tow, and the foot poulticed for a day or two with bran and cold water, to which a tablespoonful of carbolic acid has been added. This in ordinary cases is all that is required. But when the ulceration is more extensive, and after the inflammation has been reduced with the poultice, the sores must be dressed with caustic powder (*par.* 1060, No. VI.), and a pledget of tow, smeared with the tar ointment (*par.* 1072), should be inserted and held in its place by a bandage put round the top of the foot and between the digits, like the figure of 8, this giving great support.

204. Ulcerations and damage of a very serious character are also caused by **Foot and Mouth Disease**. In many cases the bones are entirely bare through this disease, so that repairs to the damaged parts are most difficult to accomplish (*par.* 464). The treatment for it is similar to that for foul in the foot (*par.* 203).

205. **Laminitis.**—Founder, or inflammation of the sensitive tissues of the foot, although of frequent occurrence in the horse, is rarely seen in the cow, yet I have had several cases arising from the after-effects of difficult parturition ; also from metastatic inflammation—*i.e.*, inflammation shifting from one part to another, as from the mammary gland to the feet. Unlike the horse, the patient is inclined to lie continually, while there is great difficulty in getting it on to its feet, when great pain is evinced, with but slight constitutional disturbance. *Treatment.*—Cold water poultices must be applied to the feet, and the antiseptic fever medicine (*par.* 1067, *No.* II.) given night and morning.

206. **Sore Feet.**—This is occasionally seen where cows have been driven long distances on a hard road—not so common nowadays as formerly. *Treatment.*—Wash the feet with some antiseptic wash (*par.* 1060, *No.* I.), cover the damaged part with a small portion of tar, and then turn the animal into a clean loose-box or good pasture. If great lameness is present, with heat in the foot, poultice for a day or two with cold water and bran.

207. **Interdigital Growths** (*fibromata*) are sometimes met with, and are mostly seen in front, at the top, and between the digits. When they get large they cause the claws to spread apart, and produce lameness. *Treatment.*—The animal must be cast, and the tumour cut out with a sharp knife, and the part dressed with antiseptic wool and tar ointment (*par.* 193), kept in place with figure of 8 bandage (*par.* 203).

208. **Overgrown Hoofs.**—Animals kept on soft litter, bulls in particular, are subject to this. The walls of the hoof grow, turn on to, and overlap the sole, while the toes get to great length. This overgrowth rarely or never causes lameness, yet interferes with the walking of the animal. All that is required is to shorten the toes with the hoof-shears (*Plate LIV.*, *No.* 2), then, with a rope over a beam, pull up the foot, and with a shoeing-knife dress off the overlapped wall from the sole.

### SHEEP.

209. The foot of the sheep in conformation is closely analogous to that of the cow.

210. **Foot Troubles and Disease in Sheep.**—Like cows, sheep are subject to foreign bodies getting fixed between the digits, to stabs or pricks in the sole of the foot, to ulceration from foot and mouth disease, to excoriation of the skin round the band of the hoof and between the claws, to excessive travelling on hard roads, and to inflammation of the blind duct or canal, found in the front of each sheep's foot. When lameness is observed, the foot should be carefully examined and dressed where required, as recommended for the cow (*par.* 203). The commonest ailment the feet of sheep are subject to is foot-rot.

211. **Foot-Rot in Sheep.**—An ulcerative disease of the feet of sheep of a highly inoculative character, and most frequently seen amongst heavy, well-bred, and well-fed sheep, folded on long luxuriant grasses and on soft, velvety turf. These take too little exercise to wear away the ground-surface of the crust of the hoof, which gets too long, turns round, overlaps and presses the sole, setting up inflammation and the formation of matter, sometimes at the band of the foot, at other times at the sole or between the digits. The matter formed separates the horn from the sensitive parts, when dirty-looking sores and sprouty growths are developed. Sheep affected with foot-rot should on no account be taken on to a farm or amongst a flock where the disease has never existed. I could relate case after case where the malady has been carried in this way. Some pastures are, however, more prone to the development of the disease than others, while on the bare rocky mountain slopes and the gritty sandy banks adjoining the sea the malady is seldom, if ever, seen.

212. *Treatment* for foot-rot is to first separate the lame sheep from the sound; next, have the lame ones turned up, and their feet examined and dressed every fifth or sixth day. All dead or broken horn should be carefully dressed off with a sharp knife,

being careful not to *cut too deep or make the part bleed* ; then the sores should be dressed with a strong solution of blue vitrol or crude carbohc acid, or a mixture of equal parts of the two, and the sheep so treated should be turned on to some sharp fallow for three or four hours every day. When the disease is very rife, and a large number of sheep are affected, a strong solution of sulphate of copper may be put into a trough, and the sheep driven through it every fourth or fifth day. **Arsenic** is also used in a similar way ; but I strongly advocate the spreading of crushed rock-salt to about 4 inches thick on the floor of a good-sized open shed or loose-box, and the animals being put in to paddle amongst it three or four hours every day. To prevent the occurrence of this complaint, the sheep ought to be turned on to some good sharp fallow for three or four hours daily.

### DOG.

213. The dog's foot differs very materially from that of the horse, cow, and sheep by having four toes and horny appendages, or claws ; with a fifth, or *dew-claw*, on the inner side of the leg, a little above the foot. Strange, this fifth appendage, or dew-claw, is found on the fore-leg of dogs of every class, but not often on the hind-limbs, the latter being mostly observed on curs, retrievers, and mongrel-bred dogs, and sometimes they are double. All sporting dogs, however, are, as a rule, exempt from them. These dew-claws are sometimes attached to the limb merely by the skin, or by a bony connexion. The ground-surface of the dog's foot is protected by five firm dense elastic pads, one under each toe and one at the back of the foot.

214. **Dew-Claws.**—These, when large, should be cut off the hind-legs, as they are of very little use, and apt to get torn, and cause troublesome sores ; they are readily removed by clipping them off with a pair of sharp scissors or bone forceps. Stop the bleeding with a pad of medicated cotton-wool and bandage, and leave this on for twenty-four hours ; then leave the wound to the antiseptic dressing of the dog's tongue.

215. **The Claws.**—Dogs that are petted, and pass the principal part of their time trotting about on carpets, have their claws growing

to such a length that in some cases the horny toe turns round and up, and penetrates the pad at the bottom of the foot, causing great pain, lameness, and inflammation. When this is observed, the feet should be put into warm water to soften the horn, and the extra growth of the nails clipped off with a pair of strong scissors or a pair of hand-spring pruning-shears.

216. **The Pads of the Foot** are subject to injuries from prods and cuts, with nails, thorns, glass, etc. The foot should be carefully examined, and if any foreign body is found it must be removed, and the parts washed with a solution of chinosol or izal. If much inflammation be present, put on a linseed meal poultice and muzzle the dog for twenty-four hours or more; then dress the wound with tincture of benzoin once or twice a day.

217. **The Interdigital Space** sometimes becomes excoriated and inflamed, and when this is seen, wash the feet with izal or chinosol solution night and morning, and dust the sores with a little fine powdered fuller's-earth.

218. **Sore Feet.**—At the beginning of the season, when the feet of sporting dogs are soft, they are apt to become tender and sore, in which case they should be well washed, cleared of all grit and dirt, and then dressed with oil of cloves, creosote, or tincture of iron; but as a rule the dog has more confidence in the antiseptic treatment of his own tongue, which generally answers much better than any application that may be used.

### FIG.

219. It is not often that veterinary aid is requested to examine and treat injuries and diseases of the feet of the pig; yet, like the cow and the sheep, foreign bodies, such as stones, bones, wood, and nails, occasionally become fixed between the digits, but, as a rule, these can be removed by the owner or his servant. When **foot and mouth disease** was rife, pigs were great sufferers from the malady, more particularly sucking-pigs, and when made to move it was pitiable to hear them scream and to see them pick up their feet.



The excoriation and ulceration round the top and between the digits were in many cases very extensive, and so severe was the pain that many died from sheer exhaustion. The *treatment* was clean dry bedding, with drachm doses of chlorate of potash in the food night and morning, for adult animals; also dressing the feet with antiseptic lotion, made with a weak solution of sulphate of zinc or sulphate of copper and carbolic acid, which was sprayed over the feet with a syringe twice a day.

## LECTURE V

### THE DIGESTIVE ORGANS

#### PART I

220. As some of the organs of digestion of *non-ruminants*, and those of *ruminants*, present marked differences from one another, and the derangements and diseases to which they are subject are still more dissimilar, I shall deal with the stomach and bowels of each separately, while the accessory organs of digestion, with their diseases, will be considered in Part II.

#### THE HORSE.

221. The digestive organs of the horse consist of—

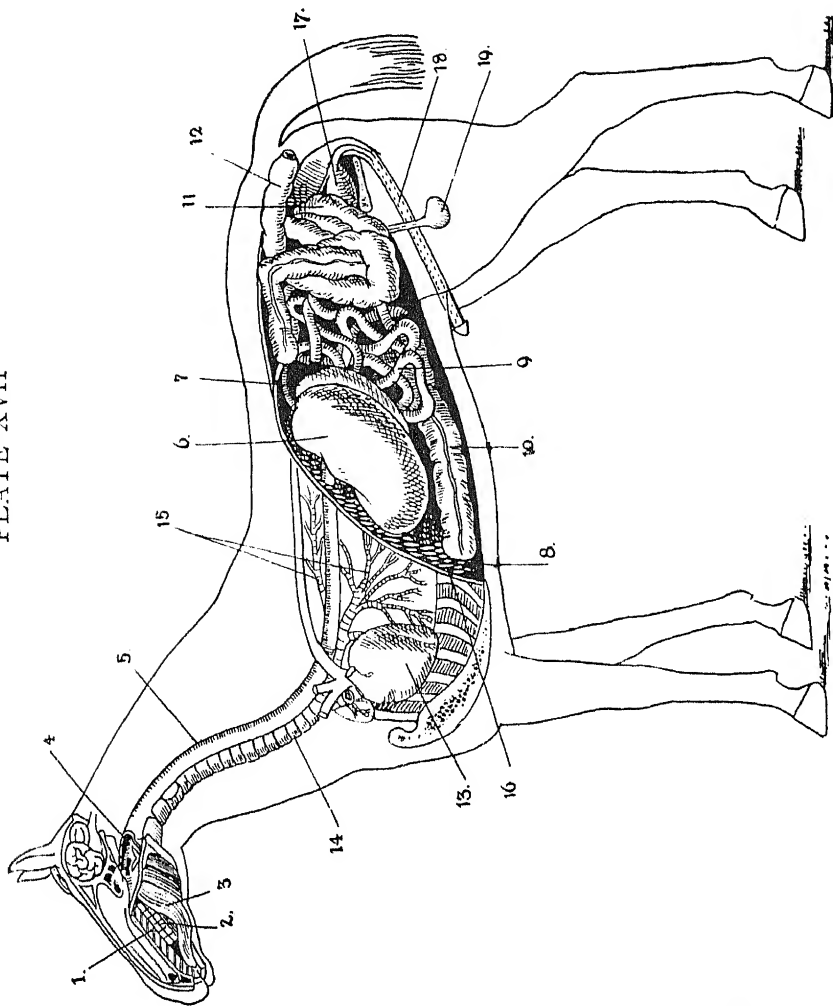
- (1) **The Mouth.**—This comprises the *lips* ; the *cheeks* ; the *hard palate*, or roof (*Plate XVII., No. 1*), which is in the form of ridges, or bars, running from side to side, between the upper molar teeth, with a longitudinal line in the middle ; the *soft palate*, at the back of the mouth, a sort of dense curtain, hanging between the mouth and throat, which from its size does not allow the horse to breathe through the mouth ; the *tongue*, and the *teeth*. Owing to the importance of the last named, they are specially dealt with in a separate lecture (Lecture VII., 'The Teeth'). The mouth is also lined by mucous membrane.
- (2) **The Salivary Glands** (situated in the region of the mouth).—There are three pairs of these—namely, the *parotid glands* (*Plate XVIII., Fig. D*), just below each ear ; the *sublingual*, underneath the tongue ; and the *submaxillary* below, and within the angle of the lower

jaw. There is also situated, in the mucous lining of the mouth, the labial, buccal, and mucous glands.

- (3) **The Pharynx**, or throat (*Plate XVII., No. 4*).—This is a muscular tube lined by mucous membrane, and connects the mouth with the **œsophagus**.
- (4) **The Œsophagus**, or gullet (*Plate XVII., No. 5*).—This is the canal which leads from the throat to the stomach, is lined by mucous membrane, and the walls are made up of longitudinal and circular involuntary muscle and connective tissue.
- (5) **The Stomach** (*Plate XVII., No. 6*) is the connecting medium between the gullet and small intestine. It inclines to the left of the anterior portion of the abdominal cavity. The stomach of the horse is very small compared with the size of the animal, and greatly resembles a bagpipe in shape. It has *three coats*: outside **serous**; middle **muscular**, of three sections; and inside **mucous**, of two parts—*i.e.*, one white cuticular, resembling the surface skin, and connected with the opening of the gullet, which enters the stomach on the left side by the *cardiac orifice*; the other pale pink, villous, or velvety, on the right side of the stomach, and this is the true digestive portion, being continued into the small intestine by the opening termed the *pyloric orifice*.
- (6) **The Small Intestine of the Horse** (*Plate XVII., No. 9*).—This comprises the *duodenum*, 2 feet long; the *jejunum*, 30 feet long; and the *ileum*, 40 feet long. The total capacity of the small intestine is estimated to be about 11 gallons.
- (7) **The Large Intestine of the Horse** (*Plate XVII., Nos. 10, 11, and 12*).—This is divided into the *cæcum*, or blind gut (commonly called the *water-bag*), 3 feet

DIGESTIVE SYSTEM OF THE  
HORSE.

1. Roof of Mouth or Palate showing the Ridges.
2. Molar Teeth.
3. Tongue.
4. Pharynx.
5. Œsophagus or Gullet.
6. The Stomach.
7. Spleen.
8. Region of Liver.
9. Small Intestines.
10. Lower Portion of Colon.
11. Higher Portion of Colon.
12. Rectum.
13. The Heart.
14. Trachea.
15. Bronchial Tubes of the Lungs.
16. Diaphragm.
17. Bladder.
18. Penis.
19. Testicle.





long, having a capacity of 4 gallons; the *colons*, *large* and *floating*, 20 feet long, with a capacity of 12 gallons; and the *rectum*, which is the termination of the intestinal canal, 2 feet long, and with a capacity of 3 gallons. The estimated average length of a horse's intestines is 97 feet, and total capacity 30 gallons. Like the stomach, the walls of the intestines have three coats: the outside *serous*; the middle *muscular* (longitudinal and circular); and the inside, covered with *epithelium* and a *mucous* membrane, and well studded throughout with various glands.

222. Besides the above named, which are found, not only in the horse, but also in the pig and dog, and in a general sense also in cattle and sheep, there are also the accessory digestive organs, that perform functions which assist digestion—that is to say, they convert the food into such a state that it can be absorbed and taken into the blood and conveyed to the different parts of the system, to be assimilated for nourishment (see Lecture VIII., 'Circulation,' The Lymphatic System). Such accessory digestive organs are the **liver**, the **spleen**, the **pancreas**, or sweetbread, and the **portal vein**, all of which will be further noticed under the Digestive Organs, Part II.

223. The Processes of Digestion are as follows, and in the order given:

- (1) The food is taken into the mouth; in the horse it is gathered in by the mobility of the upper lip, called the prehensile property, when it is seized by the incisors, or front teeth.
- (2) It is then pushed between the back (molars) teeth by the tongue; the cheeks assist the tongue in keeping it there while it is masticated, or chewed, by these teeth.
- (3) During this process of **mastication** the salivary glands pour out *saliva* (an alkaline fluid secreted from the blood). This moistens the food, thus making it easier

to swallow, and also acts chemically on a small proportion of the starchy matter, converting it into sugar by the action of a special ferment in the saliva.

- (4) The food, having been well masticated, is formed by the tongue and cheeks into a *bolus*, which is passed to the back of the mouth, where it is seized by the action of the muscles of the pharynx and pressed into the gullet, down which it is propelled by the progressive contraction of the involuntary muscular fibres of that canal into the stomach.
- (5) In the stomach it is mixed with **gastric juice**, a fluid of an acid character, which, again, acts chemically upon it. For the better accomplishment of the process, the food is being constantly rolled about, or 'churned,' by the action of the different muscular coats of this organ. The flesh-forming matters—albuminoid portions, or *proteids*—are here converted into the more soluble *peptones*, and a portion of the nutritive elements is absorbed and carried into the **portal vein**, and thence to the liver; while the rest of the food is converted into a soft-soap-like material called *chyme*.
- (6) **The Chyme** is next passed on into the small intestine. Here it is met by the **bile** (which the liver is constantly secreting), the **pancreatic juice**, or intestinal saliva (formed by the **pancreas**), and by the juices of the various small intestinal glands. The pancreatic juice, which is alkaline, and somewhat resembles saliva, has a powerful action on fats, converting them into such a form that they are capable of being absorbed, while the bile assists in the emulsification of the fats. The bile also appears to act as a natural purgative.
- (7) The different kinds of food having now been acted upon by the fluid secreted by the salivary glands and

stomach—*i.e.*, *saliva* and *gastric juice*, as well as by the *bile*, *pancreatic*, and *intestinal* fluids—the *chyme* is converted into a milky emulsion called **chyle**. While this process is going on, a portion of the new material is absorbed by the vessels of the intestines and carried to the portal vein, and so to the liver.

- (8) By the action of the muscular walls of the bowels the *chyle* is forced along the intestinal track, when numerous little bodies called **villi**, which are studded all over the lining membrane, select more of the available nutritive material, and this is carried by the lymphatic vessels into a receptacle lying under the backbone in the lumbar region, and called the **receptaculum chyli**; here it meets with other material absorbed from the posterior parts of the body, and, along with this, is carried by the **thoracic duct** into the blood by one of the **veins** (just before it enters the right side of the heart), and by means of the circulation of the blood is then distributed to all parts of the body.

- (9) The unabsorbed residue, being that which is indigestible, or in *excess of requirements*, passes along the intestines, and is expelled by the rectum as *faeces*.

224. I may here mention that a horse should never be watered *after* feeding, as it has a very small stomach. It is generally believed that, if a feed of oats be given, and then a drink of water in close succession, the water will wash the oats in front of it right along the 72 feet of small intestines into the *cæcum*, or blind gut. The food has, therefore, no chance of being digested, consequently fermentation occurs. Whether this is so or not may be an open question; but from the smallness of the stomach there can be no hesitation in stating that a horse can drink more water at a time than would fill that organ, therefore it is a safe rule always to give water before feeding. In cold weather let the horse's drinking water stand indoors for some hours before use to take the 'chill' off, and then give from half to one pailful *before* its food.



## INJURIES TO, AND DERANGEMENTS AND DISEASES OF, THE DIGESTIVE ORGANS.

225. The Lips of animals are liable to many injuries, such as being torn with nails, hooks, thorns, etc. ; and are also subject to warts or angle-berries. These growths, if large, may be cut off with a knife or pair of scissors ; if very small and numerous, an application of acetic acid twice a week, or an occasional smearing with treacle, will be found beneficial. The angles of the mouth are sometimes lacerated in the horse by the rough usage of the bit--- for this, rest and the application of some antiseptic dressing is all that is required (*par. 1069, No. II.*).

226. The Roof of the Mouth is often also the seat of injury. In cows and dogs particularly pieces of turnip, wood, nails, leather, bones, tin, etc., are apt to become fixed here. The animal foams at the mouth, cannot feed, and loses flesh. When such symptoms are shown, a close examination should be made, and if there is a foreign body it should be removed at once. When a horse is casting its front teeth, or nippers, the gums and bars behind the upper teeth usually become swollen. It does not feed well, and is said to have got **lampas**, or, more commonly, '**lampers.**' Long ago a lamper iron used to be kept by blacksmiths. This was made red-hot, and the inflamed bars were burned ; but it was a most unnecessary and cruel operation. The congested gums are only the natural effects of shedding the milk-teeth. If, however, the gums are very much swollen, a few slight cuts with a sharp knife across the bars, but not too deep, will give relief ; and  $\frac{1}{2}$  ounce of saltpetre in a mash should be given every night for a week (see Lecture VII., 'The Teeth').

227. The Soft Palate of the horse (or fleshy curtain which hangs behind the hard palate) is occasionally damaged, from various causes. For instance, it may get bruised when a ball is given on the sharp end of a stick, and this may cause troublesome abscesses. Balls should never be given on sticks. Use the hand, failing which, a balling-gun or a balling-iron may be used (*Plate LIV., No. I.*).

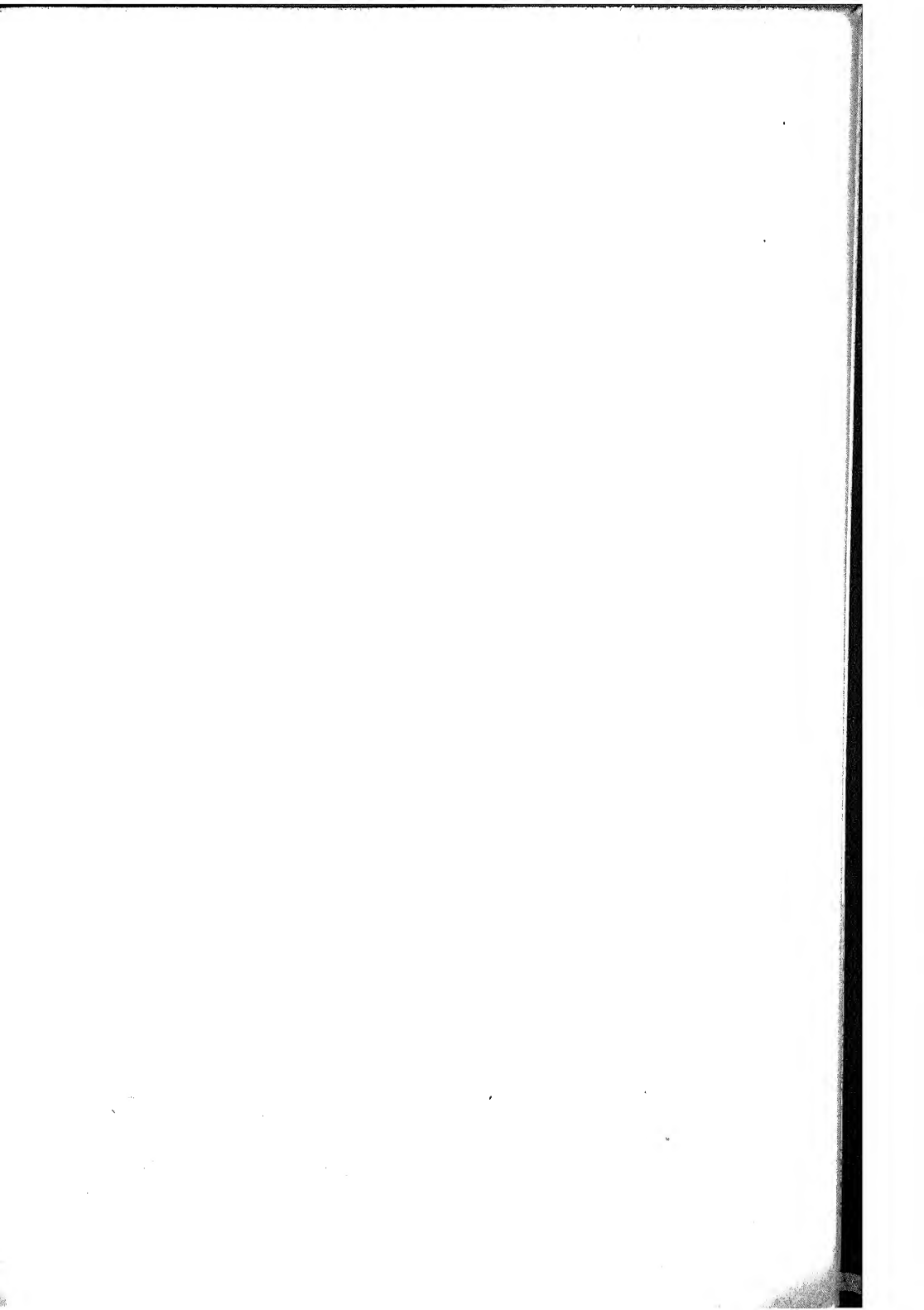
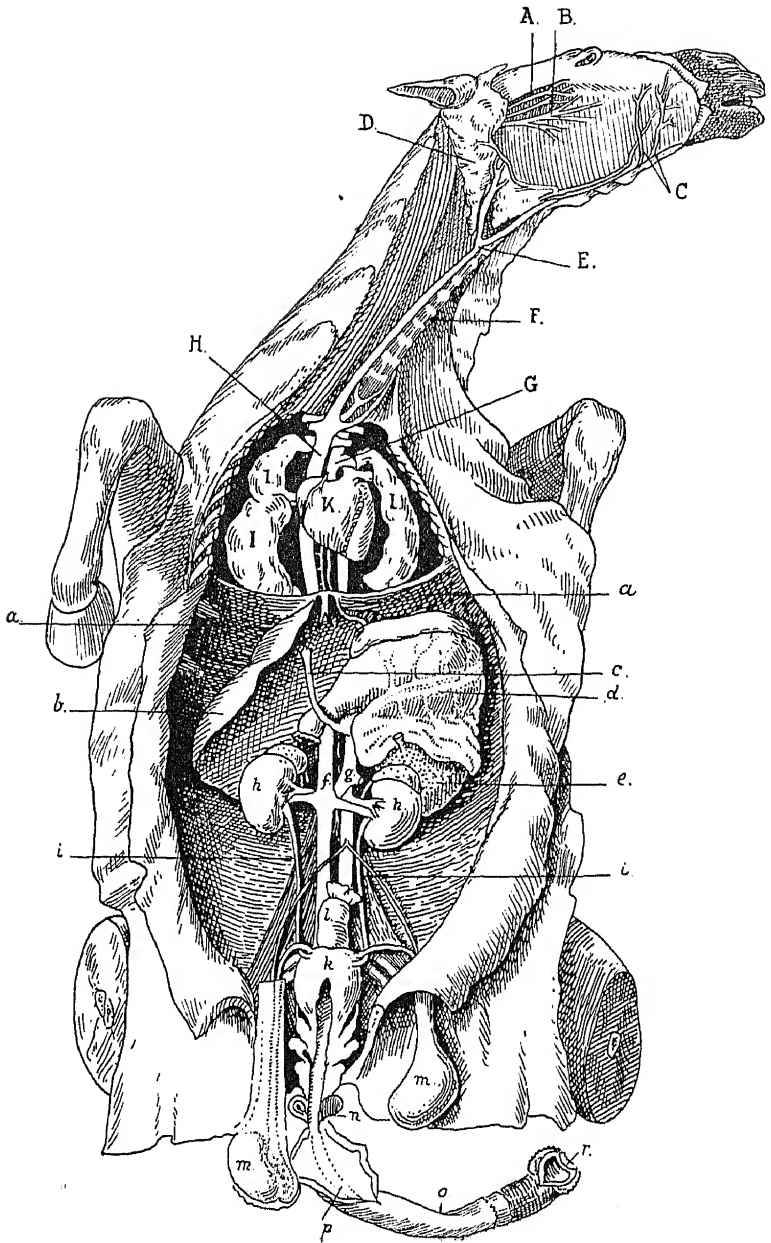


PLATE XVIII



## EXPLANATION OF PLATE XVIII

### HORSE LAID OPEN, SHOWING—

- |  |                                      |
|--|--------------------------------------|
| A. Temporal Artery.                                  | <i>c.</i> Bile Duct.                 |
| B. Branch of Facial Nerve.                           | <i>d.</i> The Stomach.               |
| C. Sub-maxillary Artery Vein and<br>Parotid Duct.    | <i>e.</i> Spleen.                    |
| D. Parotid Gland.                                    | <i>f.</i> Posterior Aorta.           |
| E. Division of Jugular Vein.                         | <i>g.</i> Posterior Vena Cava.       |
| F. Trachea or Windpipe.                              | <i>h. h.</i> Right and Left Kidneys. |
| G. Aorta.  | <i>i. i.</i> Ureters.                |
| H. Anterior Vena Cava.                               | <i>k.</i> Bladder.                   |
| I. I. Lobes of Lungs—Three on<br>Right; Two on Left. | <i>l.</i> Portion of the Rectum.     |
| K. The Heart.  | <i>m. m.</i> Testicles.              |
| <i>a. a.</i> The Diaphragm.                          | <i>n.</i> Cowper's Glands.           |
| <i>b.</i> Lobes of the Liver.                        | <i>o.</i> Penis.                     |
|  | <i>p.</i> Urethra laid open.         |
|  | <i>r.</i> Fossa in Glans Penis.      |

228. **Lower Jaw.**—The space between the corner nippers and the first molar teeth in young horses when being broken in to work is frequently injured by the use of a big heavy breaking-bit, particularly when the horse's head is bridled in too tight, and the bones at this part are in many cases so much damaged that pieces flake off—*exfoliate*—or have to be removed by an operation. The parts so injured must be dressed once a day with antiseptic lotion (*par. 1069, No. III.*), and the bit should be kept out of the mouth until the parts are healed. The lower jaw is occasionally fractured, and such an injury must be supported by plasters and splints, and the animal fed on thin gruel, hay-tea, and other slops, until union takes place. It is generally six or eight weeks before the animal can masticate solid food.

229. **The Tongue**, which in the horse is much broader at the point or apex than in the cow, has in all animals important functions to perform, being the organ of taste, and also helping the animal to swallow, etc. It is a fine, delicate, muscular organ, well supplied with nerves and extremely sensitive. It is very easily injured through ill-treatment whilst being handled by ignorant people, when it is liable to be torn, become paralyzed, and mortify; or it may even be pulled out. The entire horse 'Pickpocket,' for instance, had his tongue torn away while being given a ball. This happened on the groom taking hold of the tongue, when the horse reared up and left a large portion of the tongue in the man's hands. On two occasions I have had to cut about 4 inches off the end of the tongue of a horse through its being damaged—one being too much pulled on giving a ball, the other by putting on a twitch. In each case the member was partially paralyzed and hung out of the mouth, and was so much nipped and bitten by the front teeth—incisors—that it became quite black and mortified. It was cut off at the line of demarcation, and did well; but afterwards, on drinking, both animals plunged their heads up to the eyes in water before they could suck any up.

230. **Glossitis**, or inflammation of the tongue, may be due to injuries of various kinds, such as putting a twitch on the tongue—which ought never to be done—or giving strong medicinal agents,

undiluted. Inflammation of the tongue may also arise from some unforeseen cause; and I have seen this occur on several occasions, both in horse and cow, when the inflammation has been so extensive and the tongue so much swollen and so hard that the mouth was pressed open with the tongue protruding out of the front of the lips for 4 or 5 inches, while saliva ran from the mouth, and the animal breathed with great difficulty, being, in fact, so threatened with suffocation that tracheotomy had to be performed. These cases are, as a rule, not noticed until the disease is so far advanced that there is no chance of any successful treatment, for the mouth is so full with the swollen tongue that medicine cannot be administered. *Treatment.*—In such cases the tongue has to be scarified—that is, cut by plunging a lancet or a very sharp penknife into the protruding portion, and the mouth washed with boracic antiseptic lotion (*par. 1069, No. III.*), the lotion being injected into the mouth with an enema syringe, and suitable doses of **nuclein** hypodermically injected daily. The tongue, in many instances, also becomes hard or indurated from chronic inflammation of its substance, and when in this state has to be scarified with the lancet and dressed daily with tincture of iodine.

231. **The Frænum**—the guide or bridle of the tongue—is the membrane by which the tongue is attached to the lower jaw, and occasionally it is torn by the bit getting under the tongue, and being roughly pulled at by the rider or driver. I have seen some bad cases of this kind. *Treatment.*—Keep the bit out of the mouth until the parts are healed, and wash the mouth night and morning with the boracic acid lotion (*par. 1069, No. III.*).

232. **Ulcers** on the tongue are sometimes met with in the horse, and are generally due to injuries occasioned by the sharp edges or irregular wear of the teeth. Cows and sheep suffer from this even more than horses (see ‘Digestive Organs,’ Part II., Foot and Mouth Disease). *Treatment.*—Wash the mouth with the boracic acid lotion, and if the teeth are at fault, dress them with the tooth-rasp (*Plate XXXIII., Fig. 4.*)

233. **Dogs and Cats** frequently pick up needles and pins, or

sharp bones, which penetrate the tongue. The animal shows signs that something is wrong in the mouth by rubbing the floor with the cheeks, or poking the side of the face with the fore-paws, the saliva at the same time running from the mouth. When this is noticed, examine and remove the offending object. A common cause of injury to the tongues and mouths of horses and cattle is due to the administration of drugs, such as turpentine and ammonia, in un-

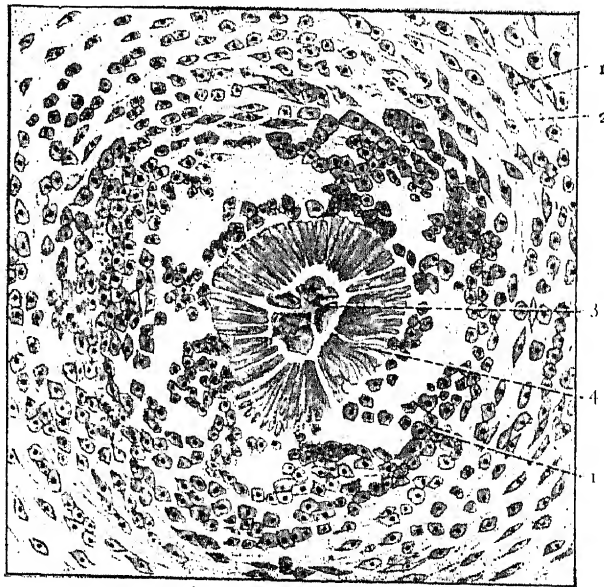


FIG. 3.—ACTINOMYCOSIS IN COW'S TONGUE.

- |                        |                                    |
|------------------------|------------------------------------|
| 1, 1. Cancerous cells, | 3. Nodules of Ray fungus.          |
| 2. Fibrous tissue.     | 4. Radiating fibres of Ray fungus. |

suitable vehicles. Turpentine should be given in linseed-oil, or, if oil is not handy, milk makes a good substitute, or it may be beaten up with eggs and water. *Never give turpentine in cold water*; but ammonia, on the other hand, should be diluted with plenty of *cold* water when administered. If strong ammonia has been administered by mistake, wash the mouth out with vinegar and water. Spirits, such as whisky, should always be diluted with the same quantity of cold water, for I have known of extensive injury having been done

to the mouth by giving raw spirits. The **tongues of horses and cattle** are often injured by thorns, pins, needles, bones, or broken teeth; and are also affected by morbid growths, such as *actinomycosis*.

234. **Actinomycosis** (Ray fungus), a complaint which may be looked upon as a morbid change in the tissues of a part, due to the presence of a vegetable micro-organism—the Ray fungus—causing an enlargement, which is composed of numerous central nodules with radiating fibres, having a star-like appearance (*Fig. 3*). Cattle are apparently the most subject to the malady, although other domestic animals and human beings are not free from its influence. Any part of the body may be affected, yet the bones of the face, jaws, and tongue are mostly attacked. When the tongue is the seat of the disease, it is known as '*wooden tongue*'; while the term of '*lumpy jaw*,' or '*big jaw*,' is applied when the disease affects the jaw. It is thought that the complaint is caused by the animals eating rough fodder, such as barley-straw, the barbs of which lacerate the lining of the cheeks or the surface of the tongue, wherein the germic organisms find a suitable bed for their development. When the tongue of the animal is affected, and as the case progresses, the patient is found rolling that organ about, holding its nose slightly up when attempting to swallow, and seems to have great difficulty in getting the food passed between the molar teeth, or rolled about for mastication. Saliva also flows freely from the mouth, the patient loses flesh rapidly, but, as a rule, is not hide-bound; and, on examining the mouth, the tongue is found to be very much enlarged and hard in places, causing considerable loss of power. When the bones of the face and jaws are attacked, the disease crawls on very slowly, and finally a large swelling is noticed on the side of the face or jaws, the surrounding tissues become implicated, and at times the complaint gets so far advanced before anything particular is noticed that the molar teeth are, on examination, found loose in their sockets, and can be easily removed with the fingers; eventually offensive, filthy-looking, fistulous sores break out on the face, with a disagreeable discharge and large fungoid granulations.

235. *Treatment*.—Iodide of potassium, given in 2-drachm doses,



night and morning, in a pint of cold water, scarifying the tongue with a sharp knife, and applying tincture of iodine to the indurated parts, occasionally answers well. When the bones are affected, the iodine treatment is of little or no avail, and surgical interference is rarely beneficial. One peculiar case I had was a cow that was losing flesh very fast. Her lower jaw was constantly on the move, and the tongue was hanging partly out of the mouth as if paralyzed. Saliva flowed freely, and there was frothing round the lips, presenting, in fact, all the symptoms of something sticking amongst the teeth or in the tongue, or an attack of actinomycosis; but examination showed that neither was the case. At times she fed, but swallowed with great difficulty, never chewing the cud, and occasionally vomiting the food. I ordered her to be slaughtered, when a large darning-needle was found sticking in the passage between the second and third stomachs. Yet the animal neither swelled nor had any cough. Another case of a cow which showed similar symptoms was, on slaughtering, found to have actinomycosis of the second stomach, the walls of which were nearly one inch in thickness.

236. **Aphtha, or Thrush**—simple inflammation of the lining membrane of the mouth. Young calves and lambs are also subject to this complaint. On examining the mouth, sometimes numerous small blebs, or vesicles, are seen, filled with a thin watery fluid, which leave little white-looking ulcers when they burst. In other cases the mouth is very red and hot, with the mucous lining peeling off, and this prevents the young animals from sucking and feeding, while, in cases of the lamb, it sometimes affects the teats of the dam, and sets up inflammation of the udder. Thrush is generally thought to be due to some derangement of the digestive organs. *Treatment*.—For lambs, 2 scruples each of carbonate of magnesia, carbonate of soda, powdered rhubarb and powdered ginger, should be given in a little cold water night and morning; and for calves double the above dose may be given, also the mouth should be washed with the boracic lotion two or three times a day (*par.* 1069, *No.* III.). Further, place blocks of rock-salt on the pastures for the animals to lick, or in the manger for the calves.

237. **Stomatitis Pustulosa**—deep-seated inflammation and ulceration of the lining of the mouth and tongue, varying in degree. Young calves, five or six weeks after birth, also sheep and lambs, occasionally suffer from small enlargements, resembling carbuncles, which form on the tongue and on the inside of the cheeks, terminating in ulcers (*stomatitis ulcerosa*), with thick granular matter at the bottom of them. Occasionally the outside of the cheeks are enlarged, when a quantity of frothy saliva flows from the lips, and the little animal does badly. These enlargements are thought by many to be due to drinking too hot milk. On looking into the mouth, ulcers will be seen on the inside of the cheeks, corresponding with the enlargements on the outside. *Treatment*.—When the thick granular matter is seen, it should be scooped out, and the wounds dressed with tincture of iron and water, or tincture of iodine, or the boracic acid lotion, while 30 grains of chlorate of potash may be given with advantage in the milk night and morning; or tablespoonful doses of Parrish's food, which is recommended to be given once a day, with 2 tablespoonfuls of cod-liver oil. The external application of iodine ointment (*par. 1066, No. III.*) to the enlargements generally has good effect.

238. **Pharyngitis**, or inflammation of the lining of the throat, may arise from a variety of causes, as injuries from foreign bodies or from a severe cold. When the throat becomes much congested and inflamed, the animal is unable to swallow, and, on attempting to drink water, a portion is returned through the nostrils. If the inflammation is at all persistent, the chances are that the horse will ultimately become a 'roarer.' In very severe cases, where the effusion, or œdema, has so swelled the inside of the throat that there is a danger of asphyxia, *tracheotomy* has to be performed. This is done by cutting out a portion of two rings of the windpipe in front, and inserting a tube suitable to the size of the animal. *Treatment*.—In cases of a mild character, stimulating embrocations, or mild blisters (*par. 1066, No. 1*) may be applied round the throat, from the root of one ear to the root of the other, and 3-drachm doses of chlorate of potash, with 2 tablespoonfuls of treacle, should

be given in a sloppy mash of bran night and morning. Some years ago I had a very severe case, which had been under the care of an unqualified man, who treated it for influenza. On examination, I found a large thorn, composed of three branches, the middle one about 10 inches long, and the two shorter ones each about 7 inches in length, sticking in the throat. This I pulled out, after it had been there three weeks; but the animal eventually turned a 'roarer,' when I performed *tracheotomy*. The horse wore the tube, and worked daily in a miller's cart for over twenty years.

239. **Postpharyngeal Abscesses**—the formation of matter or pus at the back of the throat. Cattle suffer very much from these scrofulous or tubercular abscesses. They cause the animal to make a great noise—a kind of snoring—in the breathing, so much so at times that *tracheotomy* has to be performed, thus allowing free respiration until the abscess is ready to open, which may be done through the mouth. I have operated on a number of these cases through the mouth with the small-finger embryotomy knife. As soon as the patient is better, it should be fattened right away and sent to the butcher. Tumours with long necks—*polypi*—are also found in the throat, producing somewhat similar symptoms to the abscesses just described, but they are readily twisted out by the hand.

240. **Choking**.—Partial or total obstruction of the gullet. Some horses, especially those that are greedy feeders—if the corn is not carefully spread out on the bottom of the manger—will take too big a mouthful and choke themselves. Sometimes a piece of turnip or potato sticks in the gullet, but this is very rare in the horse. The symptoms of choking in the horse are rather peculiar; the animal stands in a crouching position, with the hind-legs forward under the belly, while the head and neck are extended, and saliva flows from the mouth; the nose is pointed up and straight out, with the back of the head seemingly pulled backward and down, giving a remarkable convexity to the lower portion of the neck. The action of the muscles of the neck every now and again gives the impression that the patient is trying to eject the lodgment, and the horse occasionally gives a peculiar scream and falls down on the knees (*Fig. 4*). In

this case, all that can be reached by the hand must be removed, and the animal given a drench of warm water and skim milk mixed, or, better still, thin oatmeal gruel, which induces the action of the gullet, the gruel to be put through a milk strainer or muslin. Should this not succeed, the small end of the probang must be passed with great care. The injection of a dose of arecoline hydrobromide under the skin causes excessive salivation and foaming at the mouth, when, in some cases, the obstruction passes down into the stomach. Arecoline

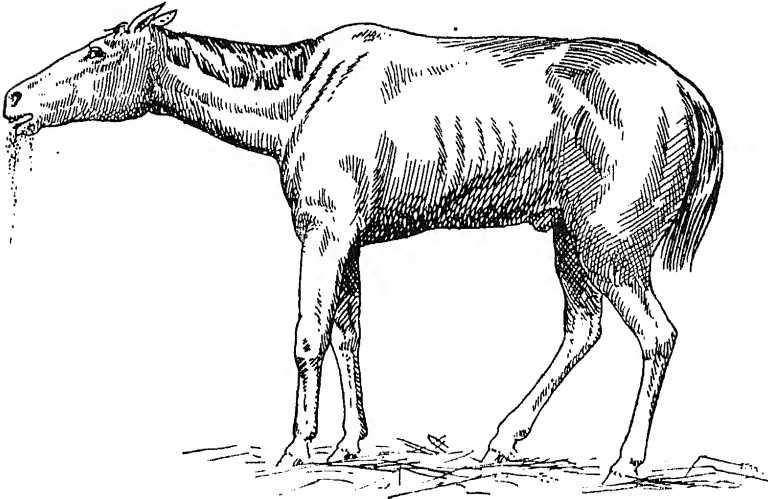


FIG. 4.—CHOKING.

can also be used for cows. **Cattle**, however, are more subject to choking than horses. They foam at the mouth and soon begin to swell up on the left side, switching the tail and stamping the feet, and this action is accompanied by diarrhœa. *Treatment*.—If the obstruction—usually a potato or turnip—can be felt, an attempt should be made to work the foreign substance up again into the mouth by putting one arm round the cow's neck and, with the fingers on each side of the gullet below the offending body, pressing it firmly and forcibly into the mouth. If this method does not succeed, and the object cannot be withdrawn by the hand, the turnip-rope may be used. This should always be done very care-

fully and not in a hurry, especially if the animal resists. Should there be a quantity of gas in the stomach and the patient much swollen it may die a mechanical death, owing to the pressure of the gas on the diaphragm, the lungs, and heart, before it can be relieved. If there is any likelihood of this happening, the stomach must be punctured so as to liberate the gas. This may be done with a *trocár* and *cannula* (Plate LIV., Fig. 6), or, in extreme cases, even with a knife, by plunging it into the stomach half-way between the last rib and the haunch bone on the left side, then turning it crosswise, when the gas will rush out. A little treacle and brown paper placed over the opening in the side as soon as the knife is withdrawn is all that is required for the wound made, and it is seldom that any bad effects follow. I have met with cases where the offending body has dropped into the stomach after the pressure of the gas was removed.

241. The **Œsophagus**, or **Gullet**, is subject to injuries and derangements: the former may be caused by pins, needles, thorns, and other foreign bodies; the latter by strictures, dilatation, or the formation of tubercular growths. All these have a tendency, particularly in the cow, to cause periodical swellings (*hoven*) on the left side similar to that seen in choking. Stricture is a contraction of the muscular walls of the gullet, and is sometimes met with in the horse and cow. Dilatation, or distension of the gullet, also occasionally affects these two animals, and may be due to paralysis of the muscular coat. In some cases of dilatation a pouch or pocket is formed, and known as 'diverticula,' and is a very serious form. All the above produce analogous symptoms to those of choking, and are very difficult to diagnose, while treatment is very unsatisfactory; the probang or turnip-rope may, however, be passed occasionally.

242. **Derangement of the Stomach** of the horse arises from many causes, such as injudicious feeding or overfeeding with too much badly-cooked food, as, for example, boiled wheat and barley, neither of which should be left to cool and then warmed up again—a common and very dangerous practice with many—as it turns sour and ferments. Wheat and barley should always be used newly

boiled. Another cause of stomach derangement arises from the animal bolting the food without chewing it, thus preventing the food being properly mixed with the salivary secretions, and, consequently, fermentation or generation of gases takes place, which may even distend the stomach till it ruptures. Colicky, griping pains may be present; but occasionally cases are met with when no such symptoms are shown, the animal standing quite still, hanging its head, blowing fast, and having its stomach greatly distended. If this is not quickly relieved, the mechanical pressure of the gas may cause death by suffocation. *Treatment*.—In such cases, at the commencement, 1 or 2 ounces of bicarbonate of soda should be given in a pint of water with  $\frac{1}{2}$  pint of whisky—this may neutralize the gas and give the stomach a fillip as well—or 2 to 4 ounces of hyposulphite of soda dissolved in 1 pint of cold water, given with 2 ounces of tincture of ginger, has a good effect. Should this not give relief, then the gas will have to be drawn off with a fine *trocar* and *cannula* (Plate LIV., No. 5), which has to be passed in on either side (preferably the right) between the last rib and haunch. On the *trocar* being removed the gas escapes through the *cannula*, giving instantaneous relief. This operation should be done by a professional man. A ball composed of 3 drachms of Barbadoes aloes, 2 drachms of carbonate of soda, and 2 drachms of powdered rhubarb, can also be given.

243. **Rupture of the Stomach**—a rent or tear in the walls of the stomach. This fatal lesion is occasionally the result of some of the causes named in the preceding paragraph, and may take place with or without inflammation. In old subjects it is thought to be due to degeneration of the walls of the stomach; but one of the principal causes is when the stomach is much distended with gas from fermentation of the food and the patient throws itself about, as in colic. When the rupture takes place, there is a sudden and great prostration of the animal, breathing is short and quick, nostrils are dilated, a cold, clammy perspiration bedews the body, accompanied by trembling and quivering of the muscles, particularly of the limbs, heavy sighs, and seeming fear to move; in fact, the animal stands obstinately until it drops and dies. Sometimes

volumes of gas are to be seen regurgitating up the gullet towards the mouth, and in some cases there is an attempt to vomit; but I have met with cases where both regurgitation of gas and vomiting have been seen without any rupture, and the cases have recovered. When rupture takes place nothing can be done; the great point is to try to prevent it. First and foremost try judicious feeding, then, when cases of intestinal disturbance, with colicky pains and gas distension of the belly, are observed, lose no time in getting the patient relieved by administering the medicinal agents named in *pars. 242 and 249 (also par. 1062, No. II.)*.

**244. Stomach Stagers in the Horse.**—A disorder of the stomach accompanied by nervous derangement. In hot, dry weather, more particularly on hilly ground, where there is a second year's growth of rye grass, the horse is sometimes attacked with this malady. As in cattle suffering from the same complaint, too early ripening or aborting of rye grass is supposed to be the cause. The horse has an unsteady gait as if about to fall, first on one side and then on the other, swinging its head backwards and forwards. If in the stable, it may be found with its nose pressed on the bottom of the manger and forehead against the wall, or steadying itself with the nose fixed between the bars of the hay-rack. The breathing is slow and laboured, and the pulse full and slow. With its simple, single stomach, the horse is much better to treat than the cow. *Treatment.*—From 4 to 6 quarts of blood may be taken to relieve the acute symptoms, which, with a 4 to 6 drachm dose of aloes (*par. 1070, No. I.*), usually sets matters right. (For treatment of cow, see Part II., *par. 304.*)

**245. Indigestion**—imperfect digestion of the food, generally due to injudicious or over feeding, and common both in horses and cattle, particularly in the former, when being fed up for shows or for the market. The horse shows no pain, but simply loses its appetite. *Treatment.*—Give 3 drachms of aloes, with 3 drachms of bicarbonate of soda, in the form of a ball, when, if the animal does not pick up, mineral and vegetable tonics may be resorted to (*par. 1073, No. IV.*). In one case which came under my care the

horse had been given all sorts of tonic medicine without any good effect, and finally selected for itself the young shoots of thorn-trees, eating these with a great relish, whilst it would take no other food unless mixed with these. They were evidently just the fillip the stomach was in need of, the tannic acid contained in the thorn being the very thing Nature required. Since that time, in the spring and summer months, I have used them with great success, chopping them up, and giving them mixed with dry oats and bran. In other cases the animals will fancy the green parts of gorse (common whins); and in winter or early spring, when an animal—the horse in particular—is slowly recovering from some debilitating complaint, such as influenza, etc., and very shy about taking its food, whins chopped up and mixed with its food answers splendidly, or a good stem, cut with a quantity of bushy sprigs on it, hung up in the box for the animal to pick at when inclined, will induce a sickly horse to eat when all other things have failed. Another form of indigestion is due to an excess of acidity in the stomach, being more common in young foals and calves than adult animals. This particular form of indigestion is known by the names of 'pica' or 'licking complaint,' owing to the subjects licking the walls, eating soil, bones, stones, etc. As treatment for young stock, giving lime-water or carbonate of soda in the milk answers splendidly; for adult animals, change the diet, and give  $\frac{1}{2}$ -ounce doses of carbonate of soda night and morning in the food.

246. **Crib-Biting** is when the horse gets hold of the side of the crib, the bar of a gate, or any other handy object, with its teeth, and, by arching its neck, gulps in air, the while making a peculiar noise, and filling the stomach with wind. This habit is often due, in the first instance, to idleness, or a form of dyspepsia. The front portions of the incisor teeth of horses with this habit get gradually worn round; but this is also seen in horses that bite at the manger or stall on being groomed. The best remedy I know of is to use the new iron fittings (made by Musgraves, Belfast), in which the front of the crib is of iron, and too broad for the horse to get a hold of. Brick troughs with a broad mould on the top, a strap round the



neck, or feeding the animal from the ground, are all useful, and worthy of a trial.

247. **Wind-Sucking** in the horse is a similar complaint to **crib-biting**, and is also a bad habit. To test a horse for wind-sucking the following can be tried: Put a handful of soft sugar into the animal's mouth and leave it for ten minutes or so. If a wind-sucker, you will generally find it standing with its nose elevated, its neck strangely arched, and making a peculiar and distinctly characteristic noise; or the tongue may be noticed curled and protruding in front of the lips, and the animal sucking for dear life. Some horses only show the habit when a sloppy mash is given to them, when they suck in the air with the mash, making a peculiar noise. Crib-biting and wind-sucking are both considered as unsoundness.

248. **Ulceration of the Stomach** is happily rare, and when it occurs there are no positive symptoms. The horse does not vomit in such cases as does a human being, but drops off its food; it loses flesh, shows no pain, becomes hide-bound, with a staring, dirty coat, is languid, and finally dies. *Treatment* is of little use. Sub-nitrate of bismuth may be given night and morning in 2-drachm doses with vegetable tonics; or 25-drop doses of strong hydrochloric acid in 1 pint of cold water night and morning can be tried. I have seen three cases, but they did no good under treatment.

249. **Gastritis**, or inflammation of the stomach, may arise from a variety of causes, such as eating rough, coarse, indigestible food, and from the effect of mineral poisons, such as arsenic or mercurial salts; or it may be induced by drinking water charged with free sulphuric acid, sulphate of iron, or strong alkalies, or by feeding on mouldy grain; while at other times it is due to worms and bots. It usually proves fatal in a very short time. The horse shows great pain, lying down, rolling about, and perspiring freely, with no intervals of rest; the nostrils dilate widely and are red inside; the under side of the eyelid is also dark red; the breathing is fast and heavy; whilst there is an anxious look in the face. The animal soon becomes exhausted, trembles all over, with cold, clammy

sweats, and finally drops and dies. *Treatment*.—To relieve the pain, 4 ounces of laudanum in a pint of linseed oil may be given at once; blankets wrung out of hot water should be rolled round the body, with a piece of stair-carpeting wound above them, or a good application of mustard and water to the belly. But professional advice ought to be sent for at the very onset, as injections of 60 to 80 drop doses of morphia and atropine under the skin are very beneficial in this complaint.

250. If the inflammation and subsequent death is due to a **mineral poison**, such as arsenic, or to **strong mineral acids**, or to **alkaline poison**, the post-mortem shows the inside of the stomach raised up, swollen, and of a ripe red-plum colour; ulcerations may also be present, whilst the pain evinced during life will have been excruciating and acute. But when it is due to the **fungi** of mouldy grain the pain is slight, with occasional colicky pains and a quick, small pulse. The horse in these cases sometimes lingers on for days in a dull, listless, sickly fashion, occasionally affected with partial paralysis. The post-mortem exhibits patches of congestive inflammation of the stomach and of the intestinal canal. In **vegetable poisoning**, such as from eating rhododendron, yew, etc., the half-dried twigs of which are more dangerous than the green growing branches, the animal exhibits little or no pain, but suffers greatly from sickness, accompanied by coma, whilst death is very sudden. *Treatment*.—Give  $\frac{1}{2}$ -pint doses of brandy mixed in 1 to 2 quarts of hot, strong coffee; or a tablespoonful of carbonate of soda and 1 wine-glassful of aromatic spirits of ammonia given in 1 pint of cold water every five or six hours, and followed up by an occasional dose of raw linseed oil. The post-mortem in cases of vegetable poisoning reveals the lining of the stomach to be much paler than normal, without any signs of inflammation, unless the plants are of an acrid nature, when congestive inflammatory patches are seen. Further reference is made to vegetable poisoning in *par.* 303.

251. **Bots** (*Plate XL., Nos. 7, 8, and 9*) are the larvæ or grubs of a species of the gad-fly, the *Gastrophilus* of the horse (*Cestrus equi*); of the order Diptera, or two-winged insect, the breeze or horse bot.

The bots, when seen in the stomach of the horse, are of a reddish-brick colour and about  $\frac{1}{8}$  of an inch long, made up in segments or rings with serrated borders, and are found in clusters varying in number from eight to ten up to between two and three hundred (*Fig. 5*). The section of the stomach from which the photo was

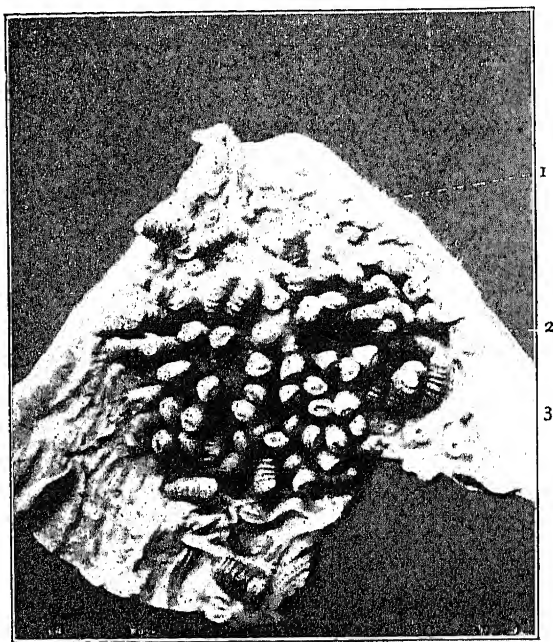


FIG. 5.—BOTS IN HORSE'S STOMACH.

1. Cuticular coat of stomach.
2. Cluster of bots (total number 203).
3. Orifices left in stomach where bots have fallen off.

taken had 203 bots attached to its lining, and was taken from a one-year-old cart colt, the animal having died from eating a large quantity of sand and soil, which had collected in the large intestine, the irritation of which induced inflammation of the feet (*laminitis*), and finally death of the patient. The morbid appetite was no doubt caused by the presence of such a large number of bots as were found in the stomach. In the year 1797 Bracy Clark, a noted veterinary

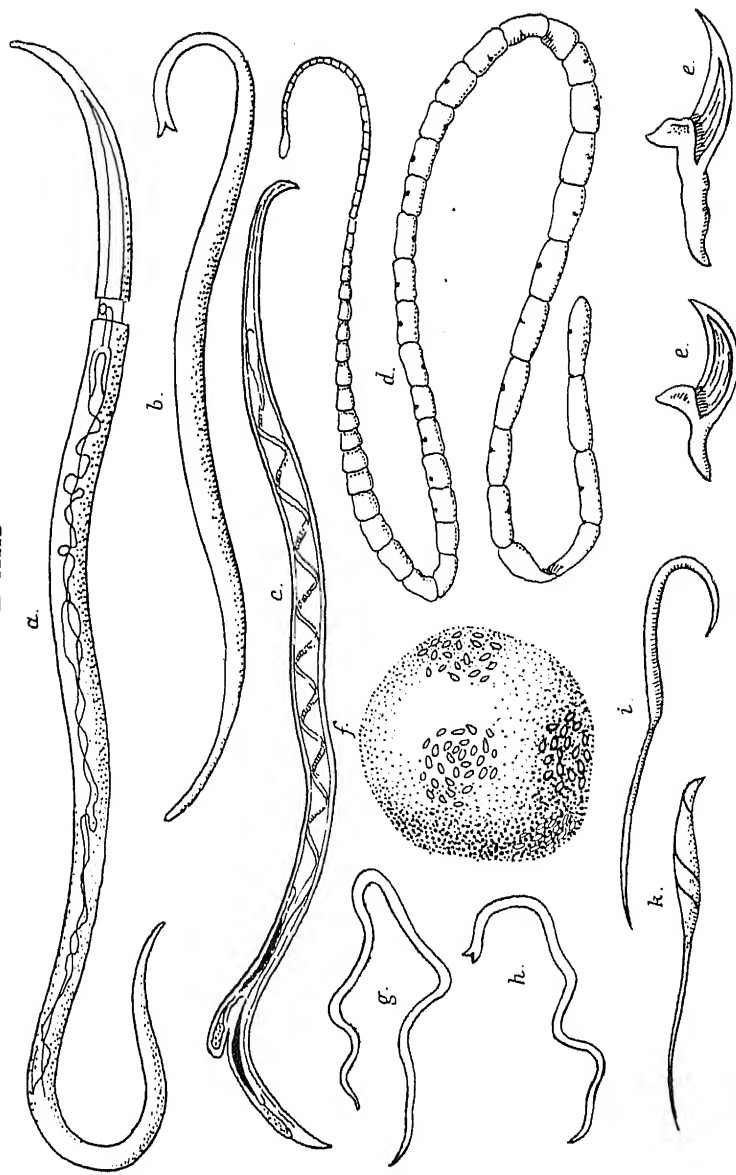
surgeon, gave a splendid account of the life-history of the *Æstrus equii*, or horse bot, which differs very little from what is known to-day. The perfect female insect resembles, both in size and colour, the humble-bee, with the exception that it has only two wings instead of four; it is provided with an egg-laying tube (ovipositor), which is carried under the body in a curved position, and about July or August, when the horses are working or grazing in the fields, the female insect is buzzing about the animals, and depositing its eggs on the shoulders and fore-legs, but more particularly behind the knee-joints, where the eggs—tiny yellow bodies—are seen sticking tenaciously to the hairs in clusters. The eggs when first dropped are covered with a gelatinous material, which glues them to the particular hair on which they are deposited. By the heat of the body of the horse combined with the rays of the sun these tiny eggs are hatched, causing an itching sensation at the roots of the hairs on which they are fixed, and in consequence of this the horse licks the parts with his tongue, when the newly-hatched embryos are carried by the tongue into the mouth, from whence they readily pass along the gullet to the stomach, and with their two little hook-like processes (tentacles) attach themselves to the cuticular or non-sensitive lining on the left or cardiac side of the stomach, where they remain from about July or August until the following May or June. The stomach of the horse is their natural habitat or winter-quarters for their development and growth during the larval stage. When spring comes again, they loosen their hold, pass away with the faeces, and fall upon the ground, when they turn into *chrysalides*, or the third stage, which occupies about four or five weeks, and in due course of time form the perfect fly (*Æstrus equii*), ready to perform another circular tour. A large number and variety of medicines have from time to time been tried, yet there is no real known remedy for bots. They seldom cause the death of a horse, as nature thickens the coats of that part of the stomach to which they are attached, so that they cannot get through. Sometimes, however, after leaving the stomach, and in their passage through the intestines, they attach themselves to the lining membrane, and set up irritation and inflammation of the bowels, and cause the death of the horse. When present in large

numbers, and attached to the inner coat of the stomach, they, however, cause the horse to lose flesh greatly during the winter and spring months, and, as already stated, cause a morbid appetite. When the bots are fully developed, they seem to realize by their natural instinct that it is time for their next transformation—that is, into *chrysalides*—to take place, and begin to lose their hold and pass out of the body, and to assist them in this process nothing beats a feed of fresh grass in early spring. Three handfuls of tansy put into 1 quart of water and boiled down to 3 gills, then strained and given as a drench, acts well as a remedy for bots. (For Symptoms and Treatment, see *par.* 253.) The best preventive to be adopted is to run a horse-singeing lamp over the legs and shoulders of the horse in harvest-time, as soon as the little tenacious yellow spots are seen.

252. **Worms.**—Parasites found infesting the various organs and parts of the bodies of domestic animals may be said to be legion. For a full description of the different kinds, their names, habits, size, form, etc., Dr. Fleming's translation of **Neumann's** 'Parasites and Parasitic Diseases of Domesticated Animals' can be consulted with interest. Some of the most common worms found in the intestines of the horse are the **Nematoda**, or round worms. The common parasites are: (1) The *Ascaris megalcephala* (*Ascaris lumbricoides*), a large round white worm, varying from 7 to 16 inches long, found in the stomach and small intestine. It is also common to the ass and mule. (2) *Oxyuris corvula*, a small curved worm, from 1½ to 2 inches long, thick and curved at the front, with a fine pointed tail, found in the large intestine, and generally known as the *mare-worm*. (3) The *Strongylus armatus*, or armed strongyle, a straight worm, in length from 1 to 2 inches, although mostly found coiled up in the walls of the large intestine—*cæcum* and *colon*—and in the intestinal canal, it is also found in the bloodvessels, scrotum, etc., and is one of the most numerous of the parasites found in the horse. (4) *Strongylus tetracanthus*, a spindle-shaped worm, varying in size up to 1½ inches in length, and found embedded in the mucous membrane of the intestinal canal (*Plate XIX.*).

253. Any one or a combination of the above-named worms may

# PLATE XIX



a. Female *Ascaris megalocephala*. b. Male *Ascaris megalocephala*. c. Female *Strongylus contortus*. d. *Tenia*  
*cæurus* (Tape-Worm of the Dog). e. e. Hooks of the Tape-Worm. f. Cyst or Watery Tumour of the Brain  
*(Cenurus cerebralis)*, showing white dots of Tape-Worm Heads. g. Female *Strongylus filaria* of Sheep.  
 h. Male *Strongylus filaria* of Sheep. i. *Strongylus curculi*. k. *Strongylus curculi*.



be present in large quantities in the alimentary canal without causing any disturbance or derangement to the system, and without any external sign to denote their presence; but when really very numerous they cause great emaciation, particularly during the winter and early spring months, when the following symptoms may be noticed: Staring coat, irregular appetite, dulness, languor, legs trailed on moving, belly tucked up, with occasional diarrhoea, and a great loss of flesh. If, on examination, nothing can be found to account for the poor anæmic condition of the horse, it may be concluded that worms are the cause, more particularly if the animal has been out grazing on an unsound pasture, or if the autumn months have been wet. **Tape-worms** are rarely found in the horse. *Treatment*.—Two ounces of turpentine mixed with 1 pint of linseed oil can be given every seventh or eighth day until four doses are given, and in the interval give every other night in the food one tablespoonful each of flowers of sulphur and common salt, and 1 drachm of sulphate of iron (*par. 1074, No. II.*). Good nutritious food, such as boiled barley and bran, eggs and milk mixed, also linseed jellies, should be given, with milk to drink. The strength must be kept up by nutritious and easily digestible foods.

254. From personal observation, I am led to hold the opinion that the ova or eggs from which some of these parasites are developed are deposited on the ground, along with the dung, during the summer months, and that they undergo some transformation outside of the body of the host, in which they are fully developed. For after wet seasons horses out at grass during August and September are generally found affected with worms and parasites, which show their effects in winter and early spring. November is, therefore, the proper time to treat such cases, before they become too well developed. One tablespoonful each of flowers of sulphur and common salt should be given in a mash of oats and bran once every day every alternate fortnight, both in the stable and at grass during the winter months. The land on which the animals pasture should be dressed with roughly crushed rock-salt—say, 8 to 10 hundredweight per acre. Although salt is the best and safest germicide we have in



nature, not nearly enough of it is applied to the land. Every year the above quantity, at least, should be put on the grazing land, lea ground, and the meadows. This will not only check parasitic diseases in horses and cattle, but will also prevent many of the insect ravages



FIG. 6.—TUBERCULAR SPLEEN OF HORSE.

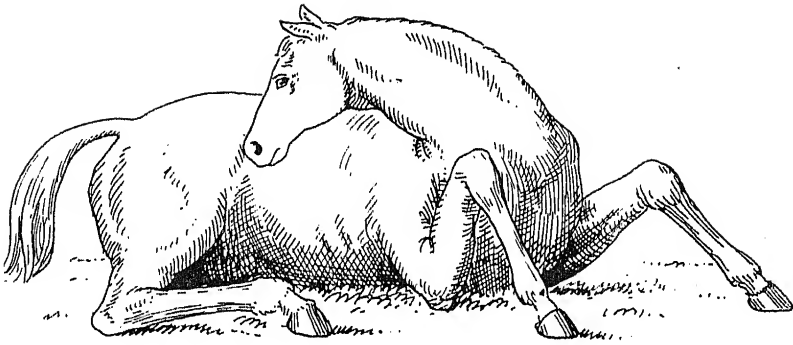
1, 1, 1. Spleen.

2, 2, 2, 2. Tubercular deposits.

and diseases of crops—as, for example, anbury or club root in turnips. But to do good, a *continued annual application is required*.

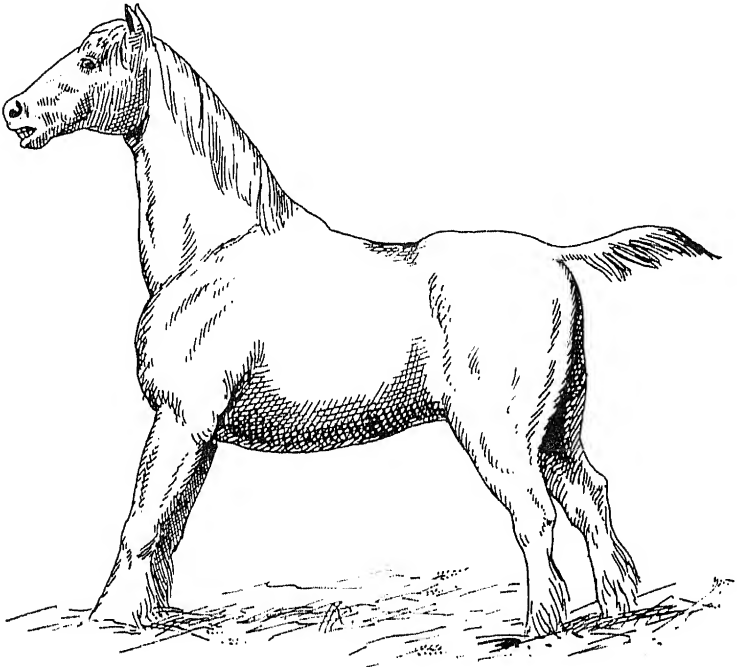
255. Colic (Plate XX. A).—Pure and simple colic may be defined as a severe crampy pain in the belly, and is classed under three different heads—viz., **spasmodic**, **flatulent**, and the two combined, or **spasmo-flatulent**. The majority of complications found in connexion with the abdominal organs are, however, accompanied

PLATE XX



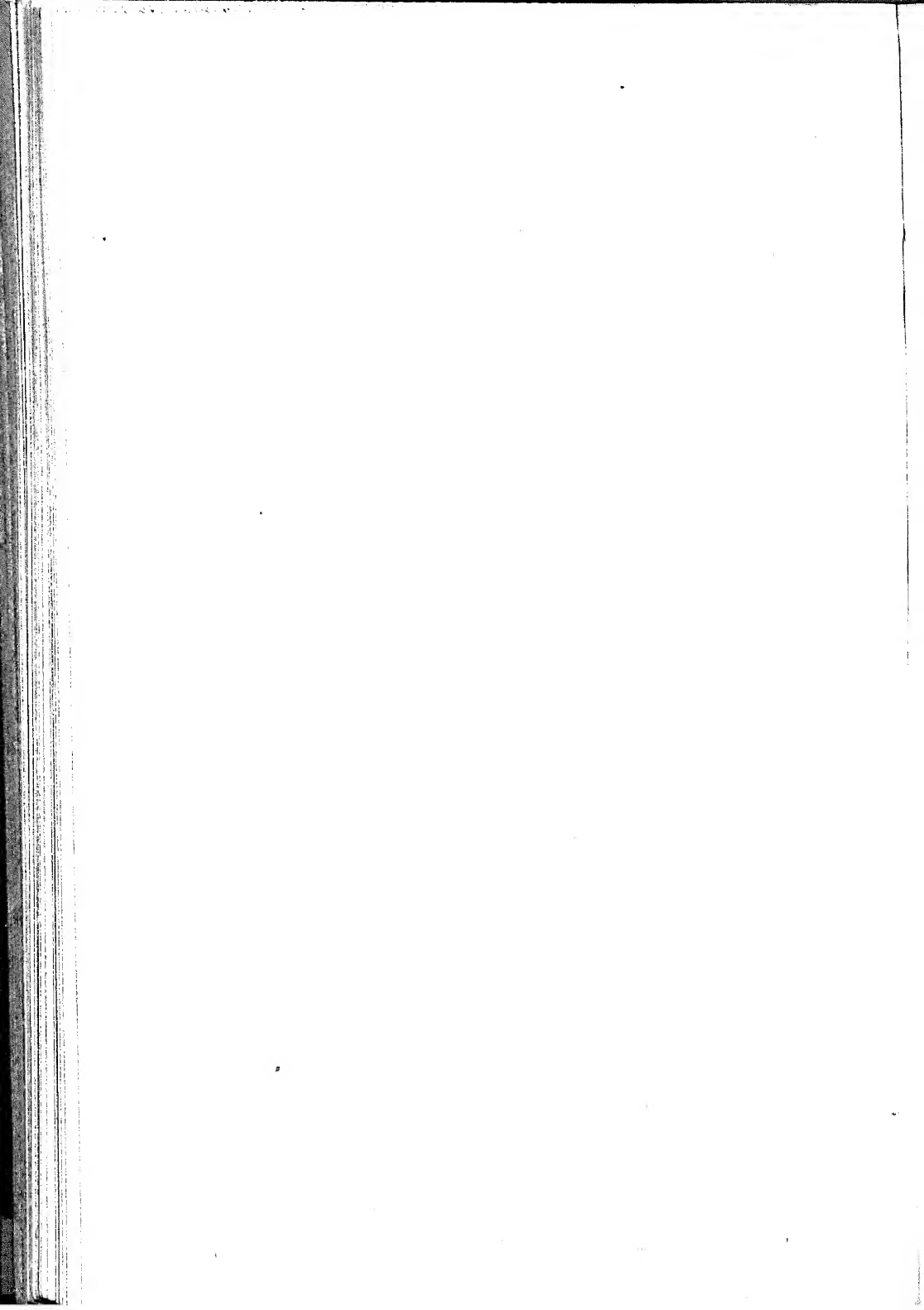
A

Horse in Colic.



B

Case of Obstruction of the Bowels from Calculus in Large Colon.



more or less by colicky pains. **Spasmodic colic** proper is due to spasm or cramp of the muscular coat of the intestines, more particularly the small intestine. It arises from a variety of causes, such as drinking cold water when the animal is heated, improper food, such as wet grass, roots, worms, sudden chills, tumours, etc. (*Figs. 6 and 7*). This was taken from a photo of a portion of the mesentery or net of a five-year-old cart gelding which died from rupture of the stomach. The animal was for about eighteen months prior to death subject to periodical attacks of colic at intervals of five or six weeks, the pains varying both in severity and duration. The animal was always in good condition. The tumours shown on the diagram are tubercular, and very unique in the horse. When first attacked, the horse wriggles the body from side to side, sniffs the ground, paws with its fore-feet, cringes on its hind-legs, bends its knees, and then throws itself down, rolls about, balances itself on its back, perspires freely, and looks back at its side, and at times sits on its haunches like a dog. This may go on for a few minutes or half an hour, when the pain leaves the animal for an interval, and it stands or lies perfectly quiet. In a short time, however, the pain returns again. No time must be lost in getting relief, as injury sometimes follows by the horse knocking itself about; or the spasm, if severe, may eventually terminate in a loop or knot in the bowel, or it may be telescoped, from excessive contraction of the longitudinal and circular muscular fibres of the intestine. *Treatment.*—From 2 to 4 ounces of laudanum, along with 2 ounces of turpentine, in a pint of linseed oil, may be given at once, and if no abatement is noticeable, repeat half the quantity of laudanum and oil in half an hour, or give ball (*par. 1062, No. II.*) Apply hot-water blankets or mustard-and-water to the belly, and give warm-water injections. Bleeding, to the extent of 6 to 8 quarts, has in some cases a very beneficial effect, but do not be too long in getting professional assistance, for hypodermic injections of morphia and atropine are here again of the greatest service (*par. 259*). A dose of arecoline hydrobromide may also be injected under the skin with advantage.

256. **Flatulent Colic** is distension of the bowel with gas,

generated from the fermentation of food, and occurs principally in the large intestine. The symptoms greatly resemble those of spasmodic colic, but, in addition, the animal is much swollen. If it is in great pain, a similar draught to that described under Spasmodic Colic may be given, and tobacco injections thrown into the rectum.



FIG. 7.—TUBERCULAR MESENTERY OF HORSE.

- 1. Portion of small intestine.
- 2, 2. Mesentery.
- 3, 3, 3. Tubercular deposits.

(Unroll from 8 to 10 inches of twist tobacco, and put in a quart of boiling water, strain, and when as warm as new milk—*i.e.*, 98° to 100° F.—give as an enema.) If this does not give relief veterinary aid should at once be summoned, when possibly the intestine may have to be punctured to allow the gas to escape, as in *par.* 242. Sometimes 2 ounces of bicarbonate of soda in a pint of water, with  $\frac{1}{2}$  pint of whisky, is found to answer well when the animal is

not much pained, or ball (*par. 1062, No. II.*). Both flatulent and spasmodic colic, if not attended to, may run on and terminate in enteritis or fatally from rupture of the stomach or bowel.

257. **Enteritis**, or inflammation of the bowels, is, as a rule, a very fatal disease in the horse, death frequently taking place in five



FIG. 8.—STRANGULATED INTESTINE OF HORSE.

1. Neck of tumour overlapping small intestine. 2. Portion of small intestine.  
3. Knot in neck of tumour. 4. Mesentery. 5. Tumour split open.

or six hours. The symptoms at the onset are much the same as those exhibited in colic, but more severe, and with this exception—*that in enteritis there are no intervals of rest, the pain being continuous.* There is a peculiar dejected appearance and an anxious expression on the animal's face; the nostrils are dilated and very red inside, and excessive perspiration covers the body, followed by cold, clammy

sweats. At length the pain disappears, the animal stands quietly, trembling, and *sighing heavily*; the pulse, which at first was full and bounding, now becomes small, weak, and scarcely perceptible, when the patient finally drops and dies.

258. Numerous lesions of the horse's bowels also occur, such as large clots of blood found between the outer and inner walls of the intestine, the symptoms of which are of a subacute nature. *Loops*

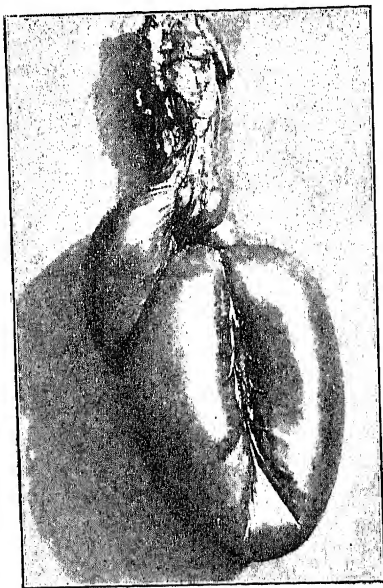
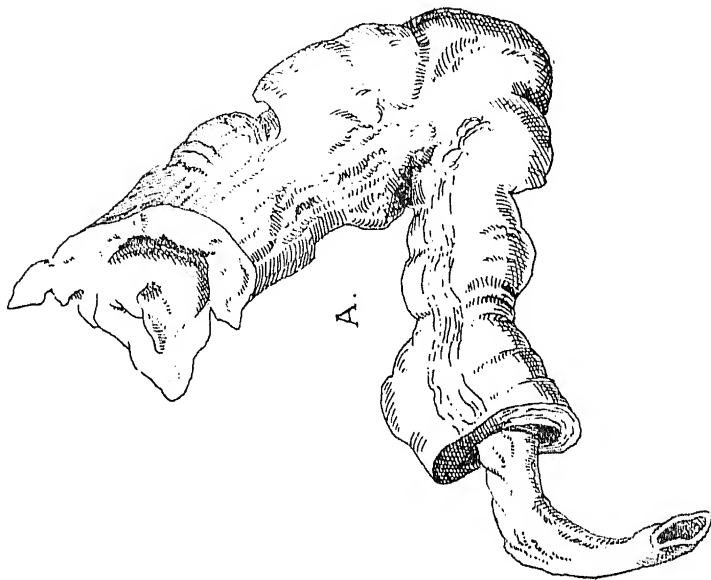


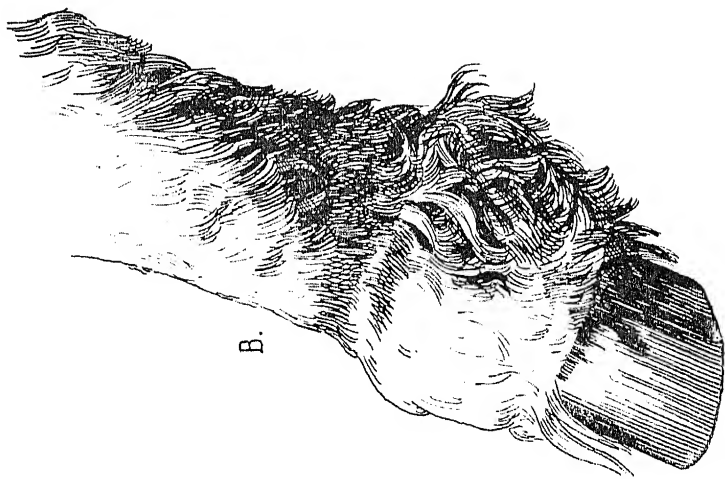
FIG. 9.—COMBINED LOOP, TWIST, AND KNOT OF SMALL INTESTINE OF THE HORSE.

or *knots* are also met with, and in these cases a rent has been made in the mesentery or net—generally caused by the horse rolling and tossing about in colic—and through this a portion of the small intestine is pushed, becoming *strangulated*, and filled with dark, congested, bloody fluid. The expression of pain in such cases is something terrible to behold, the animal being dangerous to go near. Again, we have *twists* occurring, where one portion of the bowel gets rolled over another; but the pain here is not quite so violent as in

PLATE XXI

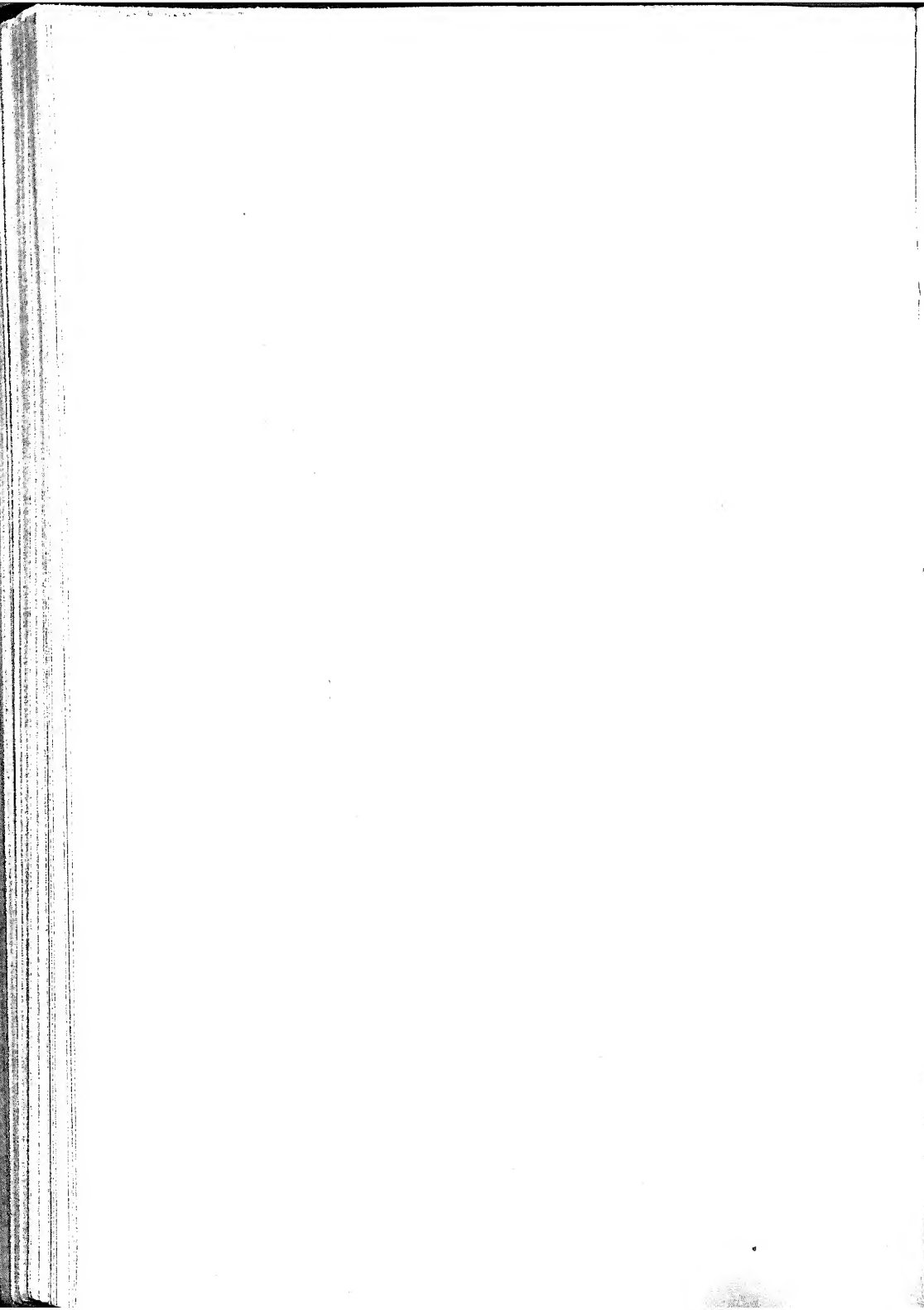


A. Telescopic Gut, 23 Inches Long.



B. Elephantiasis.





*loops*. Occasionally, through the presence of worms or action of a spasm, a part of the small intestine becomes *telescoped*—that is, drawn inside the neighbouring part. I have a specimen invaginated to the extent of 23 inches (*Plate XXI., A*). Here again the pain, though acute, is not nearly so severe as in *loops*. *Tumours* in the mesentery are sometimes formed having a long neck, which gets twisted round a part of the small intestine, thus producing strangulation. (*See Fig. 8, p. 163.*) The animal from which the photo of the section of the small intestine was taken, was ill, and suffered more or less from colicky pains from 7 a.m. on Saturday morning until 10.30 a.m. on the following Monday, when it died. It will be noticed that there is a distinct half-hitch knot in the neck of the tumour. As already stated, all these lesions are accompanied with more or less severe colicky pains, and as a rule terminate fatally.

259. *Treatment* for enteritis and lesions in the intestines is the same as recommended for *gastritis* (*par. 249*), while hypodermic injections of morphia and atropine are most to be depended on. For a number of years I have noticed in lesions of the intestines that about an hour before death the animal commences to walk round and round incessantly until it drops and dies, which symptoms I have not seen in inflammation of the stomach or bowels, although large quantities of opiates have been given.

260. **Large Intestine.**—I have frequently met with cases of *congestive inflammation* of the lining membrane of the large colon in which the walls of the intestine become intensely thick and jelly-like. These cases, in my opinion, much resemble **weed** (**lymphangitis**) in the fore or hind legs, and may be induced by giving a horse affected with weed a large dose of aloes, which, acting too strongly on the alimentary canal, causes the disease to shift from the leg to the bowels. I make it a rule in very acute cases of *weed* to use aloes very sparingly, and then only in solution and combined with linseed oil. The large intestine may, however, be attacked with this inflammatory action primarily, and without weed being present; active treatment must then be adopted—sedative medicine, such as opium, hypodermic injection of morphia, also a hypodermic dose of arecoline hydrobromide, and hot blankets round the body (*par. 249*).

261. **Concretions, or Calculi**—accumulations of lime and other matters in the bowels—occur in the large intestine, and occasionally are of a great size. They are composed of dust, and phosphate of ammonia, magnesia, or lime; some are hard as a stone, and very smooth; others are soft and convoluted. Millers' horses are most subject to these. As long as the calculi remain quiet in the pouches or part of the intestine in which they were formed, no ill-effects are seen; it is only when displaced that they produce pain, and usually death. The symptoms exhibited resemble those of knots, twists, etc. (*par.* 258), but are not nearly so acute (*Plate XX., B*). As a rule, *in all cases of bowel displacement and obstruction from calculi the animal cannot keep injections or drink water*—in fact, it strains very much when enemas are given.

262. The following is an analysis of a calculus—one of six—passed by a cob of my own, 'Quicksilver,' and analyzed by the late Professor Sibson, London :

Moisture	...	...	...	...	...	15'24	%
Fatty matter	...	...	...	...	...	traces	,,
* Animal matter	...	...	...	...	...	31'50	,,
† Ammonia, magnesia, phosphate	...	...	...	...	...	52'16	,,
Lime	...	...	...	...	...	traces	,,
Alkaline salts	...	...	...	...	...	81	,,
Silica	...	...	...	...	...	29	,,
							100'00 ,,
							5'10 %
* Containing nitrogen from animal matter and combined ammonia	...	...	...	...	...	6'19	,,
† Equal to ammonia	...	...	...	...	...	1'71	,,
Specific gravity	...	...	...	...	...		

The cob was always full of fire, with plenty of 'stamp, style, and fashion.' It never showed symptoms of pain, or ever refused its food, until the day it died, at the age of thirty years, of rupture of the stomach, caused by eating green tares. When in the stable, prior to passing the calculi, I frequently found this animal standing in an oblique fashion in the stall, with its near hind-leg forward, and the front of the off hind-leg stretched across the back of the near shank, the toe of the off hind-foot constantly in motion until the stone into which the masterpost of the partition was fixed, as well as the oak-sword, or plate, at the bottom of the partition, were worn

away. All the balls were passed within fourteen days, being found among the fæces. The largest one is  $6\frac{1}{2}$  inches in circumference very smooth, and quite round. The cob never had any medicine.

263. Calculi are of three kinds—viz., *phosphatic*, *oathair*, and *mixed*. The **phosphatic** are those described above; the **oathair**, very large, and oblong in shape, are made up almost entirely of the beard of grain, are much convoluted, and are known as the '**mulberry**'; whilst the **mixed** partake of the nature of both the foregoing,

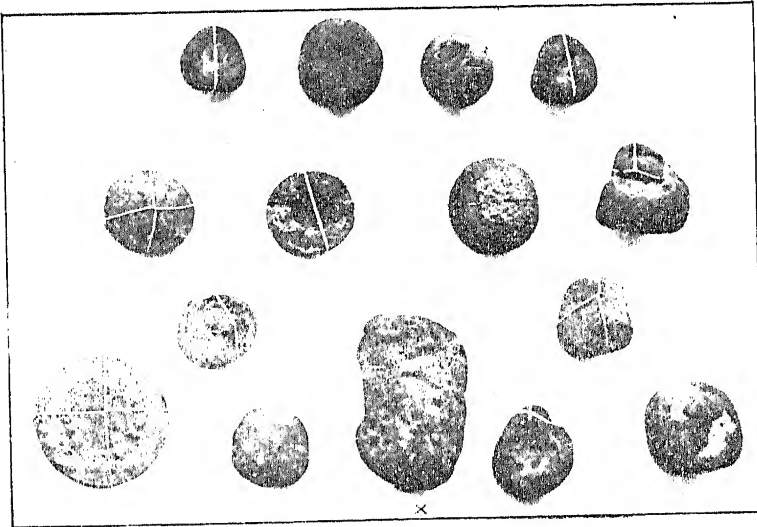


FIG. 10.—CALCULI.

× Mulberry calculi, weighed  $7\frac{1}{2}$  pounds.

but are of various shapes and sizes, and only slightly convoluted. (*Fig. 10.*)

264. **Constipation**, or **impaction** of the large bowel with food, causing inertia of the intestine and loss of tone, accompanied by partial paralysis. We may have it with or without flatulence. One of the greatest causes of constipation I have met with in the horse is a slight feed of new grass or clover—fod partially dried. The indications are slight colicky pains; the animal lies down, and may remain quiet for three or four hours, occasionally screwing itself on its belly, getting up, stretching, and standing with the hind-legs well

backwards, taking a bite of food now and again which causes the spasm of pain to return. *Treatment*.—A draught of from 3 to 7 drachms of aloes (according to the animal's size), in solution, mixed with 1 pint of linseed oil, is the best remedy. This should be accompanied by warm-water injections given every two hours, followed by a ball every four hours, and composed of 6 drachms of carbonate of ammonia and 1 drachm of powdered nux vomica. In all cases of bowel complication the symptoms at the onset are very much alike, and the great point is to get the animal relieved from pain as soon as possible by administering sedatives, such as opium, chlorodyne, chloral, or, best of all, hypodermic injections of morphine and atropine, along with a hypodermic injection of arecoline. I have found the following to answer admirably: Carbonate of ammonia, chloral hydrate, 4 drachms each; carbolic acid (B.P.), 30 drops; mix, and make into a ball, with the aid of linseed meal (*par. 1062, No. II.*), and administer every four or six hours if necessary.

265. **Diarrhœa, or Purging.**—This is a fluid or semi-fluid discharge of the contents of the bowels, and may be *acute, subacute, and intermittent*. **Acute diarrhœa** in the horse is very rare, but very dangerous, and may be due to some deleterious material, either in the alimentary canal or the system, and of which Nature tries to relieve herself by a spontaneous diarrhœa, in which case the animal is very sickly and dejected—standing quiet, breathing quickly, pulse hurried and weak, tongue dirty and breath fœtid; the inside of the eyelid is of a dirty orange colour, and great thirst is present; the fæcal discharge varies in colour from dirty brown to grey, with a very offensive smell. *Treatment*.—Great care is necessary, for if the diarrhœa is too suddenly checked inflammation of the bowels may result, generally with a fatal termination, or the irritation may be transmitted to the fore-feet, and set up laminitis—founder. My treatment for this form of diarrhœa is to give  $\frac{1}{2}$  ounce each of carbonate of magnesia, carbonate of soda, aromatic spirits of ammonia, and tincture of ginger, with  $\frac{1}{2}$  ounce of laudanum or chlorodyne in  $1\frac{1}{2}$  pints cold water (*par. 1065, No. I.*), repeating the dose every six or eight hours if necessary, also using well-boiled oatmeal

gruel strained through the milk-strainer, cheese-cloth, or open seed-bag sacking, 1 quart of the warm strained gruel mixed with 1 quart of cold water being offered frequently to the patient to drink. When the animal shows signs of recovery, a handful of dry oats and bran mixed can be put before it, with a small quantity of well-drawn clover hay to pick. **Subacute diarrhœa** may arise from injudicious feeding with improper food or a too hearty draught of cold water when heated, or from eating wet grass, or from over-excitement, particularly in long-middled, short-ribbed, narrow-made, washy-looking horses. Careful feeding of such animals is necessary, while the medicine mentioned under acute diarrhœa should be given. **Intermittent diarrhœa** is seen in young animals when casting the crown of their molar teeth, or from the presence of worms in the alimentary canal. Examine the mouth, and remove the crowns of the milk-teeth (*par. 352*), and give occasional doses of 15 ounces of raw linseed oil, mixed with 1 to 1½ ounces turpentine, repeating once every sixth or seventh day till four or five doses are given. **Super-purgation** is often caused in the horse by giving an overdose of purging medicine, and such frequently ends in *laminitis*. *Treatment* in this case is the same as for acute diarrhœa.

266. **Dysentery, or Bloody Flux**, is a blubbery fluid discharge from the bowels, mixed with blood. Although very common in cattle, it is very rare in the horse—at least, in this country. (*For Treatment, see par. 1065, No. I.*)

267. **Hernia, or Rupture**—a displacement of the bowel which may take place at various points—as, for instance, the diaphragm may be ruptured, and a portion of the intestines be pushed through into the chest, such ruptures generally terminating fatally. Or, again, the ‘belly-rind’ may become broken, and the intestines escape under the skin. In this case sew a bandage tightly round the body, to support the bowels, until the rupture is reduced.

268. **Scrotal Hernia** is very common in young foals; but in 95 per cent. of the cases the bowel returns to its proper place before the animal is twelve months old. Another very common hernia

is that of the navel—**umbilical hernia**, as it is called. The best remedy for this is to apply a special truss when the foal is first taken from its mother, or it may be reduced by an operation—casting the animal on to its back, and passing needles through the sac and ligaturing, or by a special clamp; this operation is, however, at times followed by blood-poisoning and lock-jaw.

269. **The Rectum.**—I have seen a number of cases where this intestine was damaged by a stick, or other foreign body, being passed up by malicious individuals, with the result that troublesome abscesses have formed, causing great straining and swelling round the vent and under the tail. These cases are best diagnosed by passing the hand into the rectum, when the lesion may be felt. When full of matter—pus—they have to be cut into through the walls of the bowel. Rupture of the rectum may take place where an aged mare is being served by a young and vigorous horse; a few cases of this kind have come under my notice, and invariably the groom has been blamed for injudicious service in the rectum, of which I am very doubtful, and do not favour the idea, for if the bowel be loaded with dung, the roof of the rectum is very readily torn from its attachments even during proper service. I have had two cases in mares, one of which was climbing over a fence and fell heavily on to her side into a ditch, and the rectum, which was full of excreta, was extensively torn for about 18 inches; the other case was somewhat similar, the animal falling while yoked in a loaded cart, the same misfortune occurring. Aged mares that have had several foals should always be examined, and the rectum emptied either with warm-water injections or with the hand before service. The principal injury, however, is found in the mare, when, in the act of foaling, one of the foal's feet is pushed through the roof of the vagina into the rectum, resulting in a troublesome fistula; or the rectum and vagina may be torn into one. In these cases there is, as a rule, extensive inflammation and sloughing of the parts (*par. 32*). Occasionally we meet with cases of **eversion of the rectum**, caused by impaction through some error of feeding, when, on attempting to pass the fæces, the rectum becomes turned out. In

such cases it must be well washed in tepid water and replaced at once, whilst warm-water injections should be given three or four times a day, dieting the animal on soft food, such as bran mashes, etc. When neglected, it mortifies, becomes black, and has to be cut off, which is rather a formidable operation. Young foals when newly born suffer very much from impaction of the rectum with hard balls of meconium; the animal sets up its back, strains, and presses so much that scrotal hernia is the result. Warm-water injections must be given, and the hard balls ejected with the assistance of the finger.

**270. Paralysis of the Rectum**, or a want of power to expel the contents, is occasionally met with, when the rectum becomes impacted with faecal matters which the animal has no power to expel; and this may be due to an injury to the spine, or to degeneration of the muscular and nervous tissue of the walls of the bowel, or to fracture of the pelvic or tail bones. When first noticed the external parts around the opening into the bowel under the tail is observed to be very much distended with the faeces and pressed out behind, may be to the size of a man's head; yet the patient, as a rule, feeds well, and shows little or no inconvenience. When this is seen the faecal matter has to be removed by hand about every four or five hours; as the case advances the bladder and penis become implicated, and the urine is seen dribbling on to the ground. The penis finally becomes pendulous, powerless, and swollen, when it has to be supported by a bandage round the body, for which an old lace or net curtain answers best. *Treatment* is, however, rarely successful, but drachm doses each of sulphate of iron and nuxvomica can be given once a day in a mash; a blister applied to the loins; and an infusion of oak bark injected into the bowel once or twice daily may also be tried; but, generally speaking, the animal has to be destroyed.



## DOG.

271. The arrangement of the alimentary canal of the dog is rather peculiar. The *stomach* is pear-shaped, slightly curved, and very simple; the bowels are short and nearly all of the same size, while the *cæcum* is almost rudimentary. From the guzzling propensity of the majority of dogs, the crushing and bolting of partially chewed bones, and the cramming of the stomach with raw, putrid, filthy flesh, it is strange that the dog does not suffer more from derangements of the stomach and bowels. The great point in the dog's favour is that he can readily eject matters from an overloaded stomach. Although numerous writers have from time to time written at some length on the various derangements and diseases of the stomach and bowels of the dog, I can only say that in country practice they are very rare. Those that are mostly met with are *indigestion, costiveness, impaction of the rectum, diarrhoea, worms, and liver disorders.*

272. *Indigestion*, or a want of tone to convert the food into nutriment, is mostly seen in old, fat, and pampered dogs. The symptoms are a morbid appetite, foul breath, and a great fancy for eating or chewing foreign bodies, such as rope, wood, rags, etc., accompanied by costiveness. When these are observed, the dog should be carefully watched and sparingly and regularly fed. *Treatment.*—The following tonic alterative medicine can be given: 10 grains each of powdered aloes, rhubarb, bicarbonate of soda, and extract of gentian, made up into a small ball or pill, and given once every other day if necessary. The above dose is for an adult collie or spaniel, and larger and smaller doses ought to be regulated according to the age, size, and breed of the dog.

273. *Costiveness*, or retention of the faecal matters in the intestine. The faeces of the dog are, as a rule, of a very dry nature, and usually expelled with a great amount of straining, due to the great fondness the dog has for eating bones, without a sufficiency of other food to counteract the dry, costive effect. The symptoms are somewhat analogous to those given in the preceding paragraph (272), but on pressure being applied to the belly with the fingers behind

the ribs the bowels feel hard and stiff, and pain is generally evinced'. *Treatment.* — Purgatives must be given with great caution; the medicine named in *par.* 272 can be given, followed by small doses of syrup of buckthorn and castor oil; but the most reliance must be placed on enemas, and nothing is better than 1 ounce of glycerine mixed in  $\frac{1}{2}$  pint of warm water, and injected into the bowels once every eight hours if necessary.

274. **Impaction of the Rectum**—accumulation of feces in the back bowel. This arises from causes similar to those given in the above paragraph (273), and a similar *Treatment* has to be adopted, only the hard impacted matter, which generally contains sharp pieces of bone, has to be removed with the finger, well oiled, assisted by the warm water and glycerine injections.

275. **Diarrhœa**, a discharge of the contents of the bowels in a fluid or semi-fluid condition, is often seen in the dog without any constitutional disturbance, and greatly depends on what the animal has been eating. *Treatment.*—Should the purgation become troublesome, a dose of castor oil—from 1 teaspoonful to 2 tablespoonfuls—with 5 to 30 drops of laudanum, according to age and size of dog, may be given. This may be all that is required, but if necessary, follow up with 5 to 20 grains subnitrate of bismuth, 10 to 60 grains carbonate of soda, and 10 to 60 grains of carbonate magnesia, according to age and size. Mix, and give in a little warm milk twice a day.

276. **Worms.**—From the uncleanly feeding habits of the dog, the digestive organs become a veritable harbour for worms, of which there are a great variety. The kinds mostly met with are the *Ascaris marginata*, or common round worm, and the *tape-worms*. The *Ascaris marginata* vary in size from 2 inches to 6 inches, and are generally found in the stomach and small intestines, while occasionally they are vomited up. Young puppies are frequently infested with these worms as early as a fortnight old and upwards, the eggs from which they are developed coming from the intestines of the mother. They get located under the tail and round the opening into the bowels, and are transferred from there to the teats by the tongue of the mother, and from there suckled into the stomach by the young

puppies. For these young animals, small doses of santonin—from  $\frac{1}{2}$  to 1 grain given every four or six days in a little milk—answers best.

277. **Cystic Worms.**—*Tænia*, or **tape-worms**, of which there are several kinds, are numerous in the dog. Symptoms of the presence of worms vary a great deal. Sometimes constipation is present, at other times intermittent diarrhoea, variable appetite, loss of flesh, rough, staring coat, gummy eyes, and a dry nose; in fact, the animal is all out of sorts. *Treatment.*—In all cases, particularly when the skin is much affected, a dose of worm medicine should be given. I have tried different kinds of formulas, but what I find to answer best is as follows: Powdered areca-nut, from 10 to 60 grains; calomel, from  $\frac{1}{2}$  grain to 3 grains; and tartar emetic,  $\frac{1}{2}$  grain to 3 grains, made into a ball with fluid extract of male shield fern, to be given after fasting, followed up with a dose of castor oil.

278. **Liver Disorders.**—(See Lecture VI., 'Digestive Organs,' Part II.)

### FIG.

279. Considering the scavenging habits and the filthy conditions under which pigs are generally brought up, it is a great wonder they do not suffer more from affections of the digestive organs. The ailments most commonly met with are *gastritis*, or inflammation of the stomach, *constipation*, *diarrhoea*, *worms*, and *protrusion of the rectum*.

280. **Gastritis.**—Inflammation of the stomach is generally caused by consuming irritating indigestible substances, drinking salt brine, the presence of worms, etc. When attacked, the animal is very restless, refusing all foods, vomiting, and has a great thirst, while sometimes the attack is accompanied by diarrhoea or constipation. *Treatment.*—When constipation is present, small doses of castor oil in milk can be given every six or eight hours. If the pain be severe, a teaspoonful of chlorodyne and 5 to 10 drops of pure carbolic acid may be added; warm water and glycerine enemas should be given every six or eight hours, and flannels wrung out of hot water ought

to be rolled round the body, with a waterproof covering above. When diarrhœa is present, small doses of castor oil, containing from 20 to 30 drops of laudanum, should be given at the onset, followed up with 20 grains each of bismuth, bicarbonate of soda, magnesia, and cassia, given in a little warm milk every six or eight hours if required. Young pigs often suffer from gastritis when fed on unboiled or unscalded Indian meal. When thus fed they are also liable to take fits. Indian meal should not, therefore, be given to very young pigs. Sharps or parings, with bran, well scalded or boiled, answer better.

281. **Constipation** in pigs is generally caused by injudicious feeding or through overfeeding on too much dry food. Sows that are close on pigging also often suffer both before and after parturition from obstinate constipation. *Treatment*.—If there is one thing more than another that I advocate for this ailment it is croton oil. I know of no other animal that can stand dosing with croton oil like the pig, and I have frequently given from 10 to 20 drops of croton oil mixed in 1 teaspoonful of soft sugar and put on to the pig's tongue; this can be done without much trouble. Half the quantity may be repeated if necessary. Warm-water enemas must be given three or four times in the twenty-four hours, while 2 quarts of cold water in which a dessertspoonful of bicarbonate of soda has been dissolved can be offered to drink, and this should be changed every four or five hours.

282. **Diarrhœa**, or scour, is occasionally seen in the adult animal, and is generally the result of some offending matter in the alimentary canal or system; in fact, scour is at times Nature's own cure. When seen, a dose of castor oil and laudanum may be given at the onset, followed up with bicarbonate of soda and bismuth (*par.* 275). Young pigs are great sufferers from diarrhœa when sucking, and it is mostly due to *damp floors*, bad drainage, and scarcity of good dry bedding—in fact, the want of good sanitation. *Treatment*.—First clean out the sty, thoroughly wash down the walls and floor with boiling water and carbolic acid, then limewash the walls. A good dry bed should be made of short straw or chaff, and the mother given teaspoonful doses of bicarbonate of soda three times

a day in her food. Diarrhœa in pigs is also present in cases of tuberculosis.

283. **Worms.**—As a rule pigs do not suffer so much from worms in the intestinal canal as might be supposed, considering the animal's filthy habits. There are, however, several kinds of worms found in the pig, the most common being the *Ascaris suilla*, a worm creamy white in colour, and varying from 3 to 7 inches in length, which is found in the stomach and small intestine, and is of the nematode or round worm order (*Plate XIX.*). *Symptoms.*—When infected with worms, the animal is restless and hide-bound, with the skin dirty, dry, and scaly; the belly is tucked up and the back arched; there is occasional diarrhœa and vomiting, and, when the worms are numerous, convulsions or fits. *Treatment.*—The medicines named for worms in the dog (*par. 277*) can be given in a little milk, or the powders can be mixed in castor oil and milk and administered by the aid of a clog with a wooden sole, or a strong shoe with a hole cut in the leather at the toe (*Plate LIV., No. 3*). Press the clog into the mouth of the pig and pour the medicine inside, when it will be swallowed without the danger of choking. Daily doses of one to two teaspoonfuls of flowers of sulphur answer well for worms, while turpentine in doses varying from 1 teaspoonful to 1 tablespoonful mixed with oil and milk, or beaten up with an egg and given as described above, also has a good effect.

284. **Protrusion or Eversion of the Rectum** is sometimes met with in young pigs, but most frequently in sows after parturition. When seen, the parts must be thoroughly washed with tepid water and Sanitas, smeared with extract of belladonna, and returned, and then kept in its place by stitches of tape put across the opening.

285. **Imperforate Anus.**—Calves, lambs, and pigs are occasionally born with the end of the bowel covered up, and blinded by a continuation of the skin over the opening. On manipulating with the fingers, the hard fæces are felt underneath. It is very easy with a sharp knife to cut through the skin into the canal, and to dress the wound daily with antiseptic mixture (*par. 1060, No. III.*), until the parts are healed, when the animal, as a rule, generally does well.

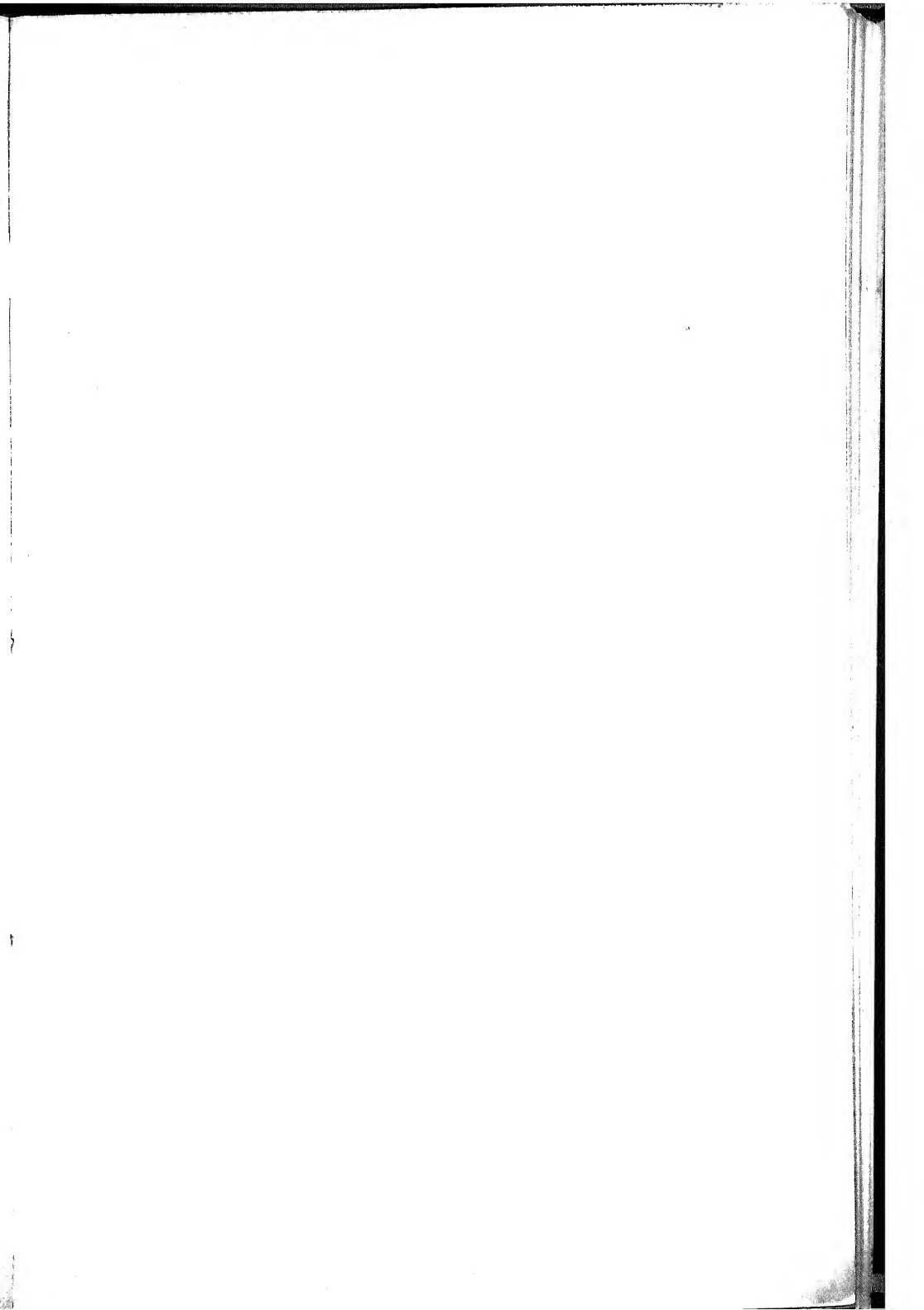
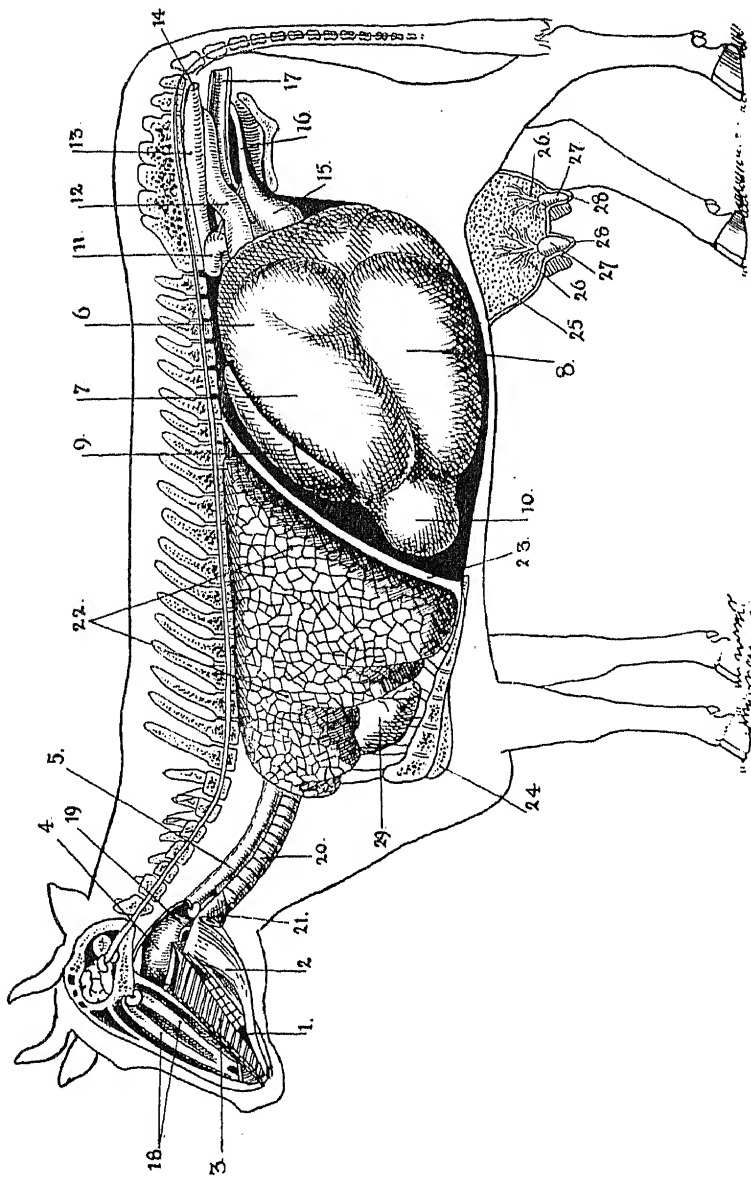


PLATE XXII



## EXPLANATION OF PLATE XXII

- |   |                                   |
|---|-----------------------------------|
| 1. Cavity of the Mouth, with 6 Molar Teeth. | 15. Bladder.                      |
| 2. Tongue.                                  | 16. Neck of Bladder.              |
| 3. Roof of Mouth showing Ridges.            | 17. Vagina.                       |
| 4. Pharynx or Throat.                       | 18. Turbinated Bones in Nostrils. |
| 5. Œsophagus or Gullet.                     | 19. Entrance to Larynx.           |
| 6. First Stomach or Paunch.                 | 20. Trachea or Windpipe.          |
| 7. Left Upper Portion of Paunch.            | 21. Thyroid Glands.               |
| 8. Left Lower Portion of Paunch.            | 22. Left Lung.                    |
| 9. Spleen.                                  | 23. Diaphragm.                    |
| 10. Second Stomach or Honeycomb.            | 24. Sternum or Breast Bone.       |
| 11. Colon.                                  | 25. Section of Udder.             |
| 12. Cæcum.                                  | 26, 26. Milk collecting Ducts.    |
| 13. Rectum.                                 | 27, 27. Milk Sinus.               |
| 14. Anus.                                   | 28, 28. Duct of Teat.             |
|   | 29. Heart.                        |



## LECTURE VI

### THE DIGESTIVE ORGANS

#### PART II

286. THE organs of digestion in ruminants, prior to the stomach itself, present few differences from those of the non-ruminants. Certainly, the mouth does contain distinctions; for whereas that of the horse has incisor teeth in both upper and lower jaws—six in each—cattle and sheep possess them in the lower jaw only, their place in the upper one being taken by a fibro-cartilaginous pad. Canine teeth are also only found in the lower jaw, and they closely resemble incisors in shape; they are placed close to the corner incisors, there being no interval between canine and incisors as is the case in the horse. The tongue, too, is of a different shape, being short and pointed, and instead of having a smooth surface, it is extremely roughened by little papillæ. It is also the prehensile agent. The soft palate, though present, is much less developed than in the horse. When we come to the stomach, however, we encounter wide differences. Cattle and sheep have four stomachs, or, to be more precise, a stomach divided into four compartments.

The first is the *rumen*, or *paunch* (Plate XXIII., Nos. I. and II., A A A A).

The second is the *reticulum*, or *honeycomb* (Plate XXIII., C C).

The third is the *omasum*, or *manyplies* (Plate XXIII., D D).

The fourth is the *abomasum*, or *True Digestive Stomach* (Plate XXIII., E E).

The first, second, and third stomachs are compartments for storing and preparing the food—more particularly the cellulose portions of it—for digestion by the fourth.

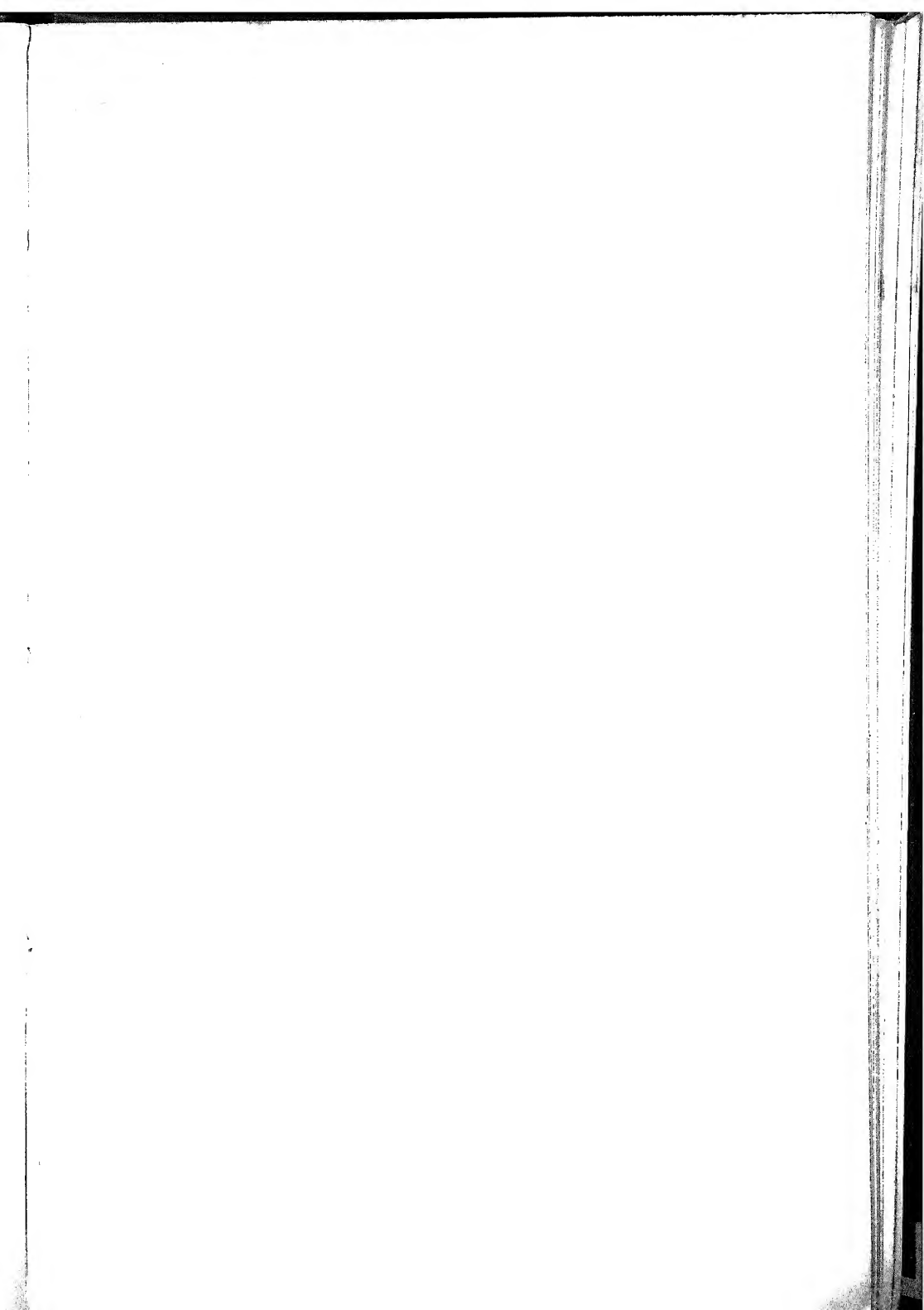
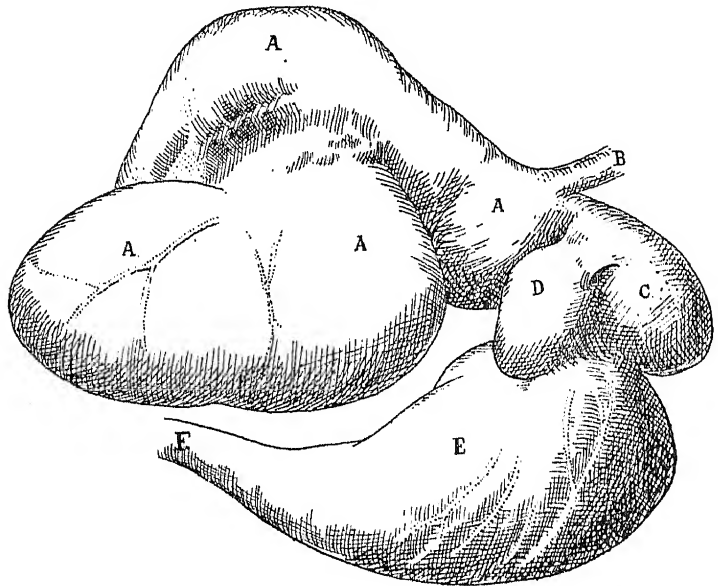
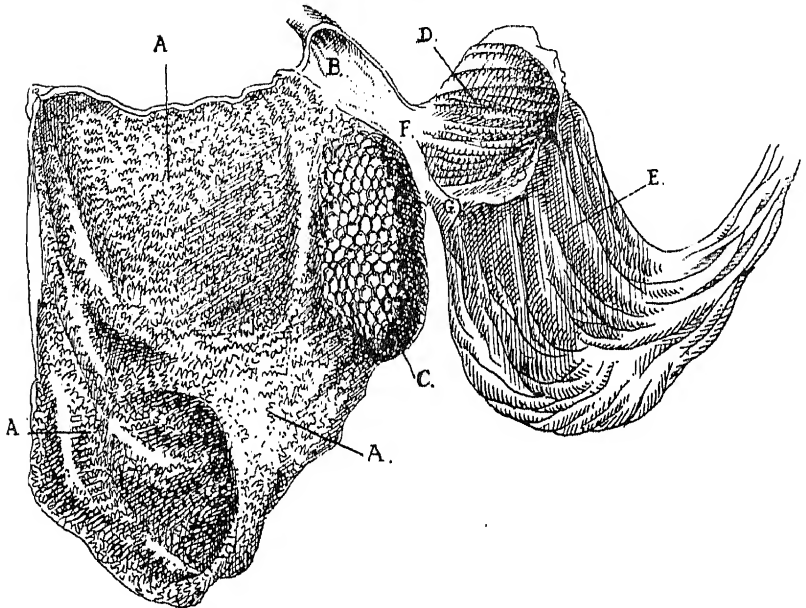


PLATE XXIII



1. External Appearance of Cow's Stomach.



2. Internal Appearance of Cow's Stomach.

## EXPLANATION OF PLATE XXIII

### 1. External Appearance of Cow's Stomach.

- A A A A. First Stomach, Rumen or Paunch.
- B. Œsophagus or Gullet.
- C. Second Stomach, Reticulum or Honeycomb.
- D. Third Stomach, Omasum or Manyplies.
- E. Fourth, True Stomach, or Abomasum.
- F. Pyloric Portion of Fourth Stomach.

### 2. Internal Appearance of Cow's Stomach.

- A A A. First Stomach, Rumen or Paunch, showing Pouches, Muscular Bands, and Papillæ.
- B. Œsophagus or Gullet laid open.
- C. Second Stomach, Reticulum, everted to show the honeycombed cell appearance.
- D. Third Stomach, showing the Leaves.
- E. Fourth Stomach, with its numerous folds.
- F. Œsophageal Canal leading to Fourth Stomach.
- G. Œsophageal Canal entering the Fourth Stomach.
- H. Small Intestine.

287. *The First Stomach, the Rumen* (Plate XXIII., A A A A), which is the largest of the four stomachs, and lies on the left side, occupies, in the adult animal, about three-quarters of the whole abdominal cavity. It has strong, muscular bands running in the walls in various directions to assist and control its actions, and is very strong. It is also lined with cuticular membrane, which is studded all over with little projections, or papillæ.

288. *The Second Stomach, the Honeycomb* (Plate XXIII., C C), which is the smallest of the four stomachs, is also lined with cuticular membrane, that is pitted all over with little cells, giving it a resemblance to honeycomb, and is covered with papillæ. This stomach acts as a sort of sifting-machine, as in it we find sand, stones, nails, pins, needles, and all sorts of foreign bodies, sifted out of the food before being sent to the third stomach.

289. *The Third Stomach, the Manyplies* (Plate XXIII., D D), has its lining membrane arranged in a peculiar manner, forming a large number of leaves, or folds; hence its name, *psalterium*, or *omasum*—manyfolds, or manyplies. The leaves run lengthwise, and extend from one end to the other, one border being free, while the other is attached to the wall of the stomach. Between the large leaves there are smaller ones, all being covered with small projections, or papillæ. The function of this stomach is to press and triturate the food before it passes into the fourth stomach.

290. *The Fourth Stomach, the Abomasum* (Plate XXIII., E E), is the true digestive stomach, and in the calf it is much the largest. The interior presents the appearance of large folds, running lengthwise over its surface, and this mucous membrane is soft, velvety, and of a pale pink hue. Here the food is chemically acted upon, as described in *par.* 223 (*No.* V.).

291. **Rumination, or Chewing the Cud.**—This process consists of returning the coarsely masticated food, stored in the *rumen*, back into the mouth, to be there remasticated and properly mixed with saliva. Some portions of the food are returned several times,

whilst others only require one chewing. My view of rumination differs considerably from that of some other writers, and is as follows: The animal fills the paunch with food of various kinds, principally of a bulky nature, taking little or no trouble to masticate it. Then, when the animal has had its fill, it rests and commences to chew the cud. Small pellets or boluses are formed by the churning motion of the rumen. These pellets are then passed to the second stomach, where the fine portions, such as meals, cakes, and bran, are sifted out, and carried at once to the third stomach, while the rougher portions are formed into a bolus and thrown up the gullet into the mouth, to be properly chewed and insalivated. This process over, it is again swallowed and sent back into the paunch; thus, some portions of the food are remasticated several times, while foreign bodies, such as sand, nails, etc., as already mentioned, are left in the second stomach. My idea of this process originated many years ago on performing *rumenotomy*—that is, cutting into the stomach and removing its contents. On putting my hand through the opening in the left side, I found in the upper and back part of the rumen a number of small pellets of food, varying in size from that of a nut to a good-sized apple, and I came to the conclusion that by the action of the muscular bands found in the walls of the paunch these pellets were rolled up and carried over the top of the food lying in the bottom of the paunch to the second stomach, to be there sifted, as already stated (*par.* 288). None of the compartments, except the rumen, is large enough to hold all the cud that the animal chews at once, and the second stomach, which is said by some to be the water-bag, is so small that it would not hold a tenth part of the quantity of water which an animal drinks at a time.

292. The **small intestine** in cattle is much less in diameter than that of the horse, yet it is about twice as long, being about 140 feet in length. The large intestine is about 36 feet in length. The **cæcum**, or first portion of the large intestine, is very simple, and oblong in shape; its free or blind end is rounded, and without any bands or furrows. It joins the *colon* at its other extremity, where it also receives the insertion of the small intestine. The **colon**, or second

portion of the large intestine, is narrow and without bands or furrows, and is arranged in irregular coils, and finally ends in the *rectum*.

293. **Sheep.**—The *alimentary canal* in sheep resembles that of cattle throughout.

### DERANGEMENTS AND DISEASES OF THE ALIMENTARY CANAL AND ACCESSORY ORGANS.

294. While in the horse the large intestine is the organ most frequently affected, cattle suffer principally from derangements and diseases of the four stomachs.

295 **Hoven, or Tympanites**, an overdistension of the rumen with gases, is of very frequent occurrence, and is both *acute, chronic*, and *intermittent*. The causes are many; but one, the most common, is due to cattle being turned on to the clover fog and gorging themselves. Hoven from such a cause is very acute and dangerous, and frequently fatal if not speedily relieved. Eating too much wet grass or frosted turnips, or drinking cold, frosted, or snow water are also frequent causes of tympanites. For the *Treatment* of such cases nothing answers better than 1 wineglassful of turpentine in 1 pint of raw linseed oil. Should this not give immediate relief, the patient must be punctured *on the left side* with a trocar and cannula (*Plate LIV., No. 6*); if this instrument is not to be had, then plunge the large blade of a pocket-knife into the stomach and turn it crossways, when the gas will escape. Fermentation of food is another common cause, and nothing is worse for this than an over-feed of potatoes, followed by a hearty drink of cold water. A beast that has unfortunately gained access to a potato-heap and gorged should not be allowed any water for three or four days. It should be fed on small quantities of rough straw, as distension from this cause is extremely dangerous, the contents being of a yeasty character. *Treatment* in such a case is to administer 2 ounces of bicarbonate of soda in 1 pint of cold water and 1 pint of whisky, or 4 ounces of hyposulphite of soda in the same quantity of water and spirit. If this does not give speedy relief, then the trocar and

cannula must be inserted into the side, and the hyposulphite of soda and water, as above, or a solution of chloride of lime, be injected into the stomach through the cannula by a small enema syringe. Choking with potatoes, turnips, etc., also causes the stomach to be distended with gas (*par.* 240). When the animal picks up foreign bodies, such as stones, bones, leather, wood, etc., or has tumours, abscesses, or hair-balls in its stomach, there are periodical or intermittent distensions about every five or six hours. These are very difficult to treat. Tablespoonful doses of *chloride of lime* in milk, or 2 ounces hyposulphite of soda in water, at times gives relief in such cases. The stomach also becomes periodically distended with gas from rupture, stricture, or dilatation of the gullet, or from a rent in the rumen (*par.* 241). In these cases, the sooner professional advice is got, the better for the animal and the owner as well.

296. **Impaction of the Rumen**—*Plenalvia, Grain Sickness*—an overdistension of the stomach with food. This derangement occurs in stall-fed animals, more particularly if they have had an excess of dry food, such as meals (of doubtful quality) or frosted turnips. The walls of the stomach become partially paralyzed, and their actions are suspended. Sometimes there is gas present, and the left side of the animal is seen to be distended. *Symptoms*.—On pressing the fingers into the flank, between the last rib and haunch bone, the stomach is felt to be full and doughy, and at times slightly ‘drummy.’ The animal stands perfectly still, emitting a peculiar ‘*grank*’ or ‘*grunt*.’ The head is extended, nose slightly lowered, and back arched, while there is a thoughtful expression on the face. The pulse may, or may not, be disturbed, but I have never seen any indication of colicky pains, as described by some. The appetite is entirely gone, and rumination is suspended; while in the milch cow the secretion is stopped. There is generally slight diarrhoea at the onset, but this soon stops, and then no faeces are passed for some days. *Treatment*.—If gas is present, 1 pint of linseed oil and 2 ounces of turpentine should be given first, followed up in an hour or so by 10 to 16 ounces of Epsom salts, along with 2 ounces each of powdered



ginger and sweet peppers, or other aromatics. These should be given in a quart of thin gruel, mixed with another pint of oil. Owing to the distension, the walls of the stomach lose their tone and become inert, and are unable to perform their function, the derangement often being further aggravated by the owner continually dosing the animal with too many sickly purgatives instead of administering warm stimulating tonics and cordials, which are mostly required after the first purgative has been given. These cases require time and patience, as they are very difficult to manage, for in many instances, and according to the will and condition of the animal, the medicine drops into the paunch or rumen and remains inert, whilst in other cases the drench passes along the œsophageal canal, through the third and fourth stomachs, and establishes its action. After all medicines have failed in this derangement, I have been very successful with an old-fashioned remedy—namely, 3 to 3½ pounds of fat bacon, cut up into small pieces and boiled for two or three hours in water, along with the addition of 6 ounces of salt, then mixed with a quart of milk, and given as a drench. This must be put in with a horn—as, indeed, ought all cattle drenches—and a few gallons or so of bran or hay tea or cold water should be placed for the animal to drink. I have rarely seen this mixture fail in having the desired effect where no organic lesion was present, and I find it answers much better than repeated doses of raw linseed oil.

297. When the rumen has become very much impacted by the animal getting loose in the byre and gorging itself with corn or other foods, medicine has little or no effect. Good results are sometimes had by cutting into the stomach on the left side, making an opening about 6 or 8 inches long, and emptying the rumen with the hand. This operation is called *rumenotomy*, and should be performed only by a fully qualified professional man, as there are several important points to be observed before, during, and after the operation. When the rumen has been distended either with gas or food, and after relief has been given, it will be some considerable time before the stomach regains its normal tone, and the animal, therefore, has to be fed with

great care and judgment. In such cases of distension, if the animal is a cow in calf, she is almost sure to abort.

298. **Vomition, or Vomiting**, a forcible ejection of the contents of the stomach through the mouth, while not of frequent occurrence in either, is oftener found in cattle than the horse. It has been said that the horse cannot vomit; but I have seen this occur at least on three occasions, when the animal dropped on its knees, pressed its nose on the ground with side movements of the head, and food came out of both nostrils and mouth. There was no rupture of either the gullet or stomach, as the animals in question lived and did well for years after. At times the feeding-trough in front of cattle is found full of vomited matter. This derangement is generally due to foods containing an excess of starchy matter, as potatoes; from chronic disease of the stomach; or from obstruction of the small intestine. *Treatment*, ounce doses of bicarbonate or hyposulphite of soda dissolved in  $1\frac{1}{2}$  pints of warm water and  $\frac{1}{2}$  pint of whisky, or 1 ounce of fluid extract of ginger added and given every six or eight hours, can be recommended, with linseed jelly or skim milk, containing  $\frac{1}{2}$ -pint doses of lime water, to drink.

299. **The Second Stomach**.—There are no set symptoms to indicate any derangement of this compartment. As already stated, it is a receptacle for all kinds of foreign bodies, some of which, such as darning-needles, shawl-pins, pieces of wire, occasionally pass through its wall, thence through the diaphragm to the lungs and heart (*par. 112*). In cases of derangement of the paunch the second stomach is also more or less implicated.

300. **Indigestion, or Impaction of the Third Stomach—Fardel Bound**.—Cattle, when hard fed in stalls, or in spring, getting a chill at grass, or through eating a mixture of old, dead, and new spring grass, or the deciduous stipules or 'bud scales' falling from oak-trees ('yak-buds,' Cumberland), frequently suffer from indigestion and constipation. Here rumination, the action of the bowels, and the secretion of milk are suspended. The animal stands in an extremely stiff and listless fashion, emitting a *continuous grunt* and

grinding its teeth, while, on pressure being applied to the spine behind the shoulders, it is likely to fall on its knees, uttering painful groans. The functions of the manyfolds being stopped, the leaves of the organ become partially paralyzed from impaction of the food. Any of the causes affecting the rumen may also occasion derangement of this pouch, and a somewhat similar *Treatment* must be adopted (*par.* 296). Small doses of purgative medicine, with cordials (*par.* 1070, *No. II.*), and from 12 to 15 ounces of linseed oil or castor oil, may be given with advantage every six or eight hours, following up this treatment by offering small quantities of rough oat-sheaf, dry hay, cabbage-leaves, etc., to induce and encourage the action of the stomach, and hay, nettle, or bran tea and cold water to drink to be offered freely. Occasionally foreign bodies, such as stones, nails, etc., find their way through the opening into this stomach, and stick there. I remember one case, in which a flat stone got tightly fixed in the entrance. The animal had a continuous dry, barking cough, held its head and nose straight out, and would not touch food or water. I ordered it to be slaughtered, and found the stone in the position named. The cough in this instance was reflex, caused by pressure on a branch of the vagus nerve. In another case five stones, a penny piece, and a nail, were the bodies of obstruction; while in a third a salmon fish-hook was fixed through three of the leaves of this compartment. *Inflammation* of the first, second, and third stomachs is very rare, either in cattle or sheep.

301. **The Fourth, or Digestive Stomach**, suffers most from inflammation (**gastritis**), and is frequently caused by the drinking of strong acids, or through mineral, alkaline, or fungoid poisons, etc. As already stated, the first three stomachs, being merely preparatory organs preparing and sifting the food for digestion by the fourth, are lined by cuticular membrane resembling the outer skin, so that poisonous materials rarely have much effect on them; but when the poison reaches the fourth stomach, with its fine velvety mucous membrane and digestive function, it soon establishes its action. I have known arsenic to have been taken by cattle, which showed no

ill-effect till the fourth and up to the eighth day, when the poisonous action set in, killing them in from four to six hours. The abdominal pain, perspiration, and excitement in these cases were something frightful to see; the animals became quite frantic, then dropped down, and died suddenly. Drinking water from streams wherein coal wash has been discharged is said to have an injurious effect on this stomach, causing great emaciation, hide-bound, chronic diarrhœa, and eventually death. I have been engaged in several litigations relative to this, and must say that I have never yet found any injurious effects arise from cattle drinking the black coal water. But should the washed material from the sides of the burning refuse banks adjoining the coal-pit—charged as it is with free sulphuric acid and sulphates—get into a stream, and animals be allowed to drink this water for any length of time, chronic inflammation of this stomach and of the bowels, with great emaciation and fatal diarrhœa, is the result, followed by a slow, lingering death from inanition. Irritation and inflammation of this stomach is at times also set up by the irritating husks of castor or croton beans and other deleterious seeds having been incorporated in feeding-cakes. Moulded cakes, particularly undecorticated cotton-cake, have also a very injurious and frequently fatal action on this stomach. **Micro-organisms.**—**Small worms**—*Strongylus contortus* and other thread-like pests which infest the lining membrane of this stomach and intestines of both cattle and sheep—also cause great irritation, exhaustion, diarrhœa, and extreme emaciation, and this is particularly the case in young animals in cold wet seasons (*par.* 309). *Treatment.*—First find out the cause, and, if possible, remove it, and follow the recommendation laid down in *par.* 249. The post-mortem appearance of the stomach resembles that exhibited in the horse, as noted in *par.* 250.

302. **Lead-Poisoning** is both *acute* and *chronic*. In the acute cases the attack is sudden, and resembles stomach staggers (*par.* 304) at first, or the latter stages of milk fever (*par.* 582), accompanied by paralysis and coma, and may be caused by the animal picking up spent bullets near rifle ranges or grazing on lands near lead-

smelting works, but it is most frequently seen on pastures where town rubbish has been spread, or where the scrapings of paint-tins and tea-lead have been deposited; sometimes it is due to the animal getting to tins of white lead and eating the contents. I have seen three cases from this latter cause. The salts of lead are very sweet, and cattle eat them with great relish. *Treatment* is generally of very little avail; 60-drop doses of sulphuric acid, largely diluted with cold water, might be pumped into the stomach, to act on the lead chemically, and form the insoluble sulphate of lead; and this should be followed up by  $\frac{1}{2}$ -pint doses of raw linseed oil every six or eight hours. In chronic lead-poisoning the animal slowly dwindles away, blue lines being noticed round the gums. Thirty-drop doses of sulphuric acid, with 1 drachm of sulphate of quinine, given in 1 quart of cold water twice a day, is in such cases useful.

**303. Vegetable Poisons.**—Plants of a poisonous nature are many, and, considering their distribution, it is astonishing that there are not more fatal cases. Some of the most common and well-known poisonous plants are as follows: **Hemlock** (*Conium maculatum*); **Fool's parsley** (*Aethusa cynapium*); **Water hemlock, or cowbane** (*Cicutavivrosa*); **Water dropwort, or dead tongue** (*Eranthe crocata*); **Deadly nightshade** (*Atropa belladonna*); **Foxglove** (*Digitalis purpurea*); **Monkshood** (*Aconitum napellus*); **Yew-tree** (*Taxus baccata*); **Rhododendron** (*Ponticum*). The half-dried twigs of the yew-tree and rhododendron, as already stated, are more acute and dangerous than the green branches (*par.* 250). The water dropwort, or dead tongue, is sometimes mistaken for the water hemlock, or cowbane; both plants are, however, poisonous to cattle, and great care should be taken, when ditches are being cleaned out, that the roots of these plants are gathered, dried and burnt, as, when half dried, cattle are very fond of them. The green leaf of the foxglove, in the winter months, when the ground is covered with snow, is also dangerous to sheep, and should be cut down and removed from pastures on which sheep are grazing. Vegetable poisons usually prove fatal on account of the peculiar arrangement of the stomach compartments of cattle and sheep, which permits of

large quantities of the poisonous material being gathered before the poisonous action is established, thus rendering treatment of little avail. *The symptoms of, and treatment for, vegetable poisoning* are discussed in *par.* 250. **Acorns.**—Although pigs eat acorns with impunity, yet when taken in excess by horses and cattle they are very dangerous, causing indigestion and, at times, death. When plentiful, they should be gathered off the ground. Two tablespoonfuls of ground coffee put into 2 quarts of hot water, stirred well up, and drenched into the animal every four or five hours in cases of vegetable poisoning, has a highly beneficial action. An occasional teacupful of raw linseed oil can also be added with advantage.

304. **Stomach Staggers**, acute indigestion with head symptoms, is most frequently seen in the summer months, more particularly in dry seasons, and where cattle are grazed on hilly pastures or on first and second years' crop of seed-grass; it is not nearly so rife on old-laid pastures. It is thought to be caused by the rye-grass aborting, or seeding prematurely, but an overfeed of green rye-corn will cause the identical same symptoms. No doubt the heat of the sun and the dryness of the grass in the first place have much to do with it, through inducing acute indigestion with head symptoms, while in the second place some peculiar chemical action seems to take place just when the rye is blooming, so that if large quantities are consumed about this time, the rye has a peculiar toxic action, producing delirium, followed by coma. *Symptoms.*—The animal stops feeding and chewing the cud; the hair looks dingy and on end, with muzzle dry; the sides appear flat, the belly tucked up, and the patient is very listless. If a milch cow, she suddenly drops off her milk. This goes on for thirty-six or forty-eight hours, when the pupil of the eye is noticed to be dilated, and the eye has a starry appearance; the breathing is slow and heavy, and the animal stands over on its fetlocks. At the commencement there is slight diarrhoea, followed by considerable constipation, due to the want of nervous energy in the stomachs and bowels. If large doses of purgative medicine have been given, there may be a watery discharge from the bowels,

but little or no fæces. At this stage the animal begins to press its head against the wall and snores loudly, or when let out seems quite blind, rushing forward or backward, and tumbling over any object which may be in the way. *Treatment.*—The administration of strong saline purgatives, such as Epsom or Glauber's salts, are to be strongly condemned. In the first stages raw linseed oil, in from 8 to 10 ounce doses, mixed with 1 drachm of quinine and a teacupful of whisky, should be given every six or eight hours in 2 quarts of strong coffee; plenty of boiled gruel, linseed jelly, and bran or hay tea and cold water, should be offered the animal to drink, the object being to get some food into the stomach to neutralize, or at least modify, the action of that which is causing the complaint. Once the patient begins to press its head against the wall, the best plan is to have it slaughtered.

305. **Spasmodic Colic** in cattle is mostly manifested by the animal kicking at its belly, switching and twisting the tail, lying down, and getting up with occasional intervals of rests, for one or two hours, when a renewed attack occurs, and this condition lasts for twelve or more hours. As already stated, the arrangement of the intestines of cattle is quite different to that of the horse; they are much smaller, but a great deal longer. On account of cattle being of a less excitable temperament, they do not suffer so much as the horse from bowel complaints, but are more prone to stomach derangements. Spasmodic colic in the cow is sometimes readily enough relieved, but at others may go on for some days. *Treatment.*—From 8 to 12 ounces of linseed oil should be given, mixed with  $\frac{1}{2}$  to 2 ounces each of veterinary chlorodyne and turpentine, and half the quantity repeated in six or eight hours if necessary.

306. **Enteritis**, or inflammation of the bowels, in cattle is, happily, very rare. The animal lingers on for four to six days, whereas in the horse it would prove fatal in as many hours. Nor do cattle exhibit the acute symptoms seen in the horse, but lie continuously, breathing quickly, with a sharp, moaning grunt, and appearing very much depressed. *Treatment.*—Chlorodyne from 4 drachms to 2 ounces, or the same quantity of laudanum, in 8 to 12 ounces raw linseed oil,

can be given every four to eight hours, and blankets wrung out of hot water should be rolled around the body, with a waterproof covering on the top.

307. **Gut-Tie** is due to some false membrane forming in the abdominal cavity and getting attached to or encircling some part of the intestines. It is mostly found in young bullock-stirks, yet I have seen cases in young heifers. Unlike horses, cattle bear this very patiently, lingering on for six or seven days, where it would only take a like number of hours for a horse to fight itself to death. The animal stops feeding, twitches the hind-quarters, elevates and twists the tail, crosses one hind-leg over the other, and occasionally, with pain, passes a small quantity of bloody mucus. If let out, it has a great tendency to walk backwards, and, if near a bank, will back its hind-legs on to the top, and stand with its fore-feet in the ditch. This appears to give great relief. *Treatment.*—It is dangerous in this ailment to give large doses of purgative medicine. Small doses (5 to 8 ounces) of linseed oil, with 1 ounce of chlorodyne, may be given every six or eight hours to keep the patient quiet, but hypodermic injections of morphia and atropine are most to be relied upon. Another remedy recommended is to cut into the right flank, pass the hand through the opening, and endeavour to find the cord and divide it, if possible; but this operation should only be attempted by a professional expert. In one case, that of a bullock, I passed my hand as far up the rectum as possible, and, when working along, felt a cord outside the bowel. I gave it three gentle pulls, when it broke. The animal got immediate relief, and did well.

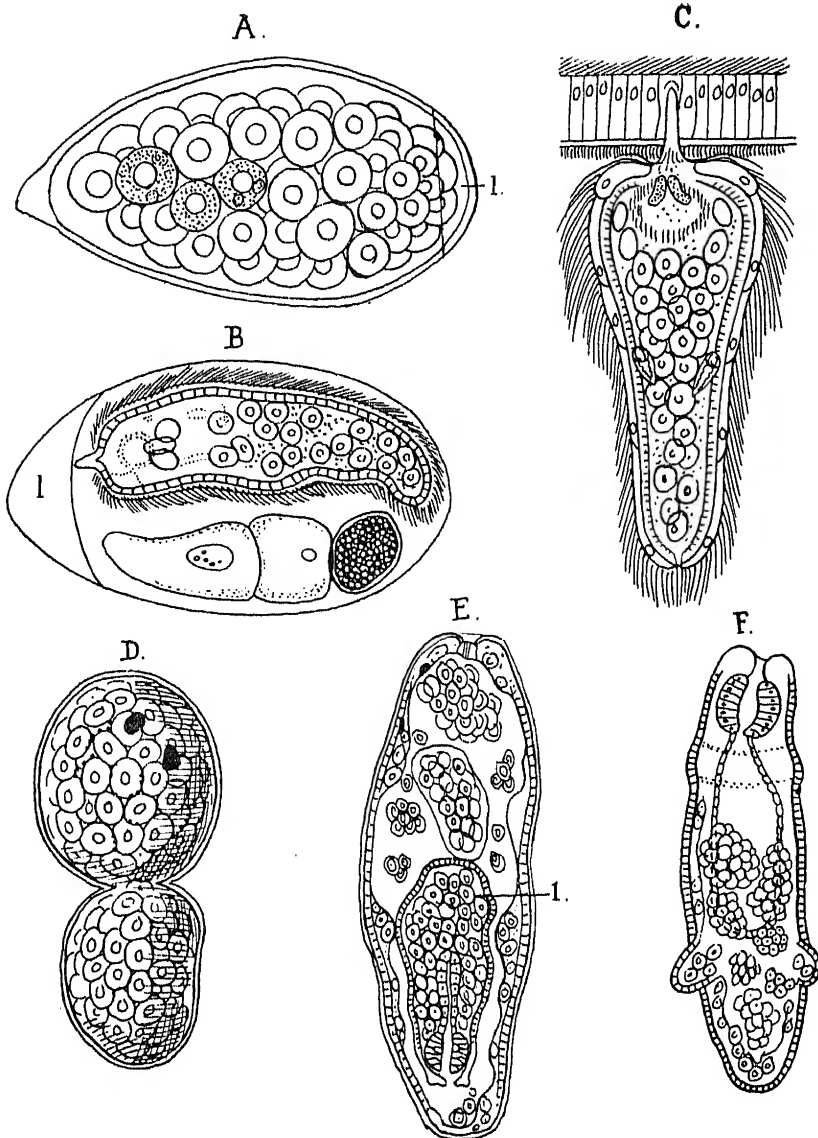
308. Before going any farther, I must add a word of caution, which is, never to horn gruel into an animal recovering from an illness, as is too frequently done. If the patient will drink cold water, hay or nettle tea, milk, or oatmeal gruel, offer them frequently, and entice it to eat with all sorts of tit-bits of food—oat-sheaf for preference, wheat, or barley-straw, sliced potatoes, etc.—so as to induce chewing the cud, which the horning in of nutriment prevents, and therefore retards recovery. Again, while injections are very serviceable in bowel complaints in the horse, they are of



little or no use to cattle. In all ailments in cattle one very pronounced symptom is evident, that being the dryness of the muzzle.

309. **Diarrhœa, or Scour,** is *acute, chronic, and intermittent*, and a very common complaint in cattle. It is due to a variety of causes, such as eating frosted turnips, coarse indigestible or wet grasses, or from worms, liver flukes, and scrofula, or tuberculosis. Young cattle, coming two years old, suffer most, in which case a very common cause is turning them out on to grass in wet autumns, or on to oat-stubble, where the oats have been shaken and have germinated on the ground. These corn growths are very dangerous both to young cattle and sheep, and should be avoided, as they harbour the ova of intestinal and other worms. The crowns or shells of the temporary teeth not coming off at their proper time is also another great inducement to diarrhœa in young stock. The mouth should, therefore, be examined and the shells removed (*par.* 368). Worms—the *Strongylus contortus*, found in the lining membrane of the fourth stomach and intestines, and flukes found in the liver—constitute other chief causes of chronic or intermittent diarrhœa, as do also myriads of bacilli located in the lining membrane of the intestine, causing thickening and corrugation of the bowel, now known as Johnes' disease, a complaint that has been rife in certain districts for generations past. The animals are known as 'wasters,' but are quite free from tuberculosis, a thickened intestine and enlarged gall-bladder being found on post-mortem. The real nature of the malady has not been known until of late years, and although the animals feed and chew the cud fairly well, they gradually lose flesh, become hide-bound, and finally die from inanition. Young animals under twelve months old, as well as adult cattle, are affected, the malady arising from the animals grazing on certain wet, low-lying, undrained pastures—nursery-beds for the disease-producing germs, which have been left by previously affected animals, or been carried by floods or other agents. To destroy the germs the land should be dressed in spring or autumn with 5 to 6 cwt. of ground rock-salt to the acre, and McDougall's health-licks or lump rock-salt laid on the grazing-ground in various places for the animals to lick; whilst for

PLATE XXIV



- A. The Egg of the Liver Fluke. 1. The Lid or Cap.  
 B. The Egg of the Fluke, containing an Embryo ready for Hatching. 1. The Cap or Lid.  
 C. The Ciliated Embryo of the Fluke boring into a Snail (*Limnaeus truncatulus*).  
 D. A Young Sporocyst dividing into Two.  
 E. A Fully-developed Sporocyst, showing a Young Redia. 1. The Young Redia.  
 F. A Redia, showing Mouth and Stomach.



treatment I have found nothing to equal 3 drachms of chloride of sodium (common salt), 1 drachm exsiccated iron, 1 drachm nux vomica, 3 drachms powdered quassia, mixed for one dose for an adult animal and given as a drench in gruel every other day, to which add 1 wineglassful of cod-liver oil and 30 drops of oil of cloves or creosote. A good, mixed, nutritious diet of corn, cake, bran, etc., should be fed to the patients. Young animals under twelve months old when turned out on to strong, wet, undrained lands in summer and autumn also suffer greatly from intermittent scour. **Derangement and disease** of the liver of various kinds are often also the means of producing scour. So, seeing that there is such a multitude of causes, it is of the greatest importance to the owner, as well as to the veterinary surgeon, to find *the cause*, and treat accordingly.

310. Upon no consideration should diarrhoea be stopped suddenly, as it may be due to some hidden ailment which Nature is trying to relieve in her own way. *Treatment*.—In the early stages 8 to 12 ounce doses of linseed oil, along with from  $\frac{1}{2}$  to 2 ounces each of chlorodyne and aromatic spirits of ammonia, may be used with great advantage, following it up with vegetable and alkaline tonics, while at times the preparations of iron are useful (*par. 1073, No. IV.*). Good nutritious food of an easily digestible character should also be given, such as crushed oats, bran, and linseed cake, milk, and linseed jelly, and upon no consideration should a small quantity of salt be omitted from the food at each end of the day. Where the affection is attributable to worms or flukes, small and repeated doses of oil and turpentine may be administered with great advantage (*par. 1074, No. I.*), and the lands should be dressed with salt.

311. **Liver Fluke** is a frequent producer of diarrhoea, and often with a fatal result, both in young cattle and sheep. As it is also the cause of a great amount of troublesome litigation amongst neighbours, a sketch of its character may not be out of place here. The liver fluke, or *Distomum hepaticum*, is of the Order Trematoda, or flat suckorial worms. It has a very interesting history, passing through seven stages, between fluke and fluke, six of which are accom-

plished outside the body of the sheep, or host (*Plates XXIV. and XXV.*, showing the various stages through which it passes). The flukes are bisexual, having both male and female organs in one body, and are generated from little eggs. These eggs are developed inside the parent fluke, which lies in the bile-ducts of the liver of the host, and are ejected from the parent by one of its openings and carried by the bile to the intestines, and there eventually carried, ejected, and deposited on the ground in the droppings. As many as 200 flukes have been counted in one liver, whilst the number of eggs generated by these has been reckoned at 7,400,000, or about 40,000 to each fluke. The eggs are about  $\frac{1}{180}$  of an inch long and  $\frac{1}{300}$  of an inch broad. Mr. A. P. Thomas's summary of the life-history is as follows :

'The adult fluke in the liver of the sheep produces enormous numbers of eggs, which are distributed with the droppings of the sheep. If these eggs have moisture, and a suitable degree of warmth, they continue to live, and in each is formed an *embryo*. The embryo leaves the egg, and swims in search of the particular snail, *Limnaeus truncatulus*, within which its future life and growth take place. The embryo bores into the snail, and then grows into the form which is called a *sporocyst*. The *sporocyst* gives rise to the second generation. This is known as *rediae*. The *rediae*, in turn, produces the third generation, which has the form of a tadpole, and is called *cercaria*. The *cercariae* quit the snail, and enclose themselves in envelopes, or *cysts*, which are attached to the grass. When the grass to which the *cysts* adhere is eaten by the sheep, or other suitable host, the young liver fluke comes out of the *cyst* and takes up its abode in the liver of its host, and the fatal circle is thus completed. It will be seen, therefore, that the fluke disease is one which alternates between a particular snail and the sheep. A sheep cannot take the infection *directly* from another sheep, nor can one snail take it *directly* from another snail. The sheep, by spreading the eggs of the fluke, gives infection to the snail, and the snail, in turn, by harbouring and distributing the *cercariae*, conveys the infection to the sheep.

'The conditions necessary for the existence of liver-rot in any given locality are as follows :

- '1. There must be fluke eggs on the ground.
- '2. There must be wet ground, or water, during the warmer weather, for the eggs to hatch in.
- '3. A particular snail, called *Limnaeus truncatulus*, must be present.
- '4. Sheep, or other animals, must be allowed to feed on the same ground without proper precautions being taken.

'If any one of these conditions remains unsatisfied, there can be no fluke disease or liver-rot in the locality.

'If the eggs of the liver fluke are to be hatched, they must be in water, or, at least, be kept moist, during some weeks of warm weather, or even some months if the temperature be lower. If the eggs are once thoroughly dried, their vitality is destroyed, the side of the shell being usually crushed in. A temperature of about 74° to 78° F. is the most favourable, and then the embryo is formed in about two or three weeks; with less warmth progress is slower, and with an average temperature of 60° the growth occupies two or three months.

'Ground is often, with reference to the "rot," spoken of as "*sound*," or, on the contrary, as "*rotting*." When the droppings, containing fluke eggs, fall on to a field, the rain will distribute the eggs over the surface, washing them down to the roots of the grass. If the soil be light or sandy, and porous, the land will be "*sound*," for the water will filter into the earth, leaving the eggs on the surface, where they will get dried, and so be destroyed. If, on the other hand, the soil is heavy and clayey, so that the rain-water does not sink into the ground, but flows along the surface, the ground is "*rotting*." For, as the water flows over the surface, it carries the fluke-eggs along with it, and deposits them in ditches, holes, marshy places, or furrows, where the water stands—all of them provinces where the eggs will hatch. The obvious remedy for this evil is to drain the land thoroughly and efficiently, and it will not only do much to prevent the rot, but will have the further advantage of greatly improving the herbage. Where it is not practicable to adopt this remedy at once, either salt or lime may be scattered over its surface with advantage. Both these substances destroy the embryos of the fluke, and, at a later period, the *cysts*, when attached to the grass; and, still further, they will destroy the snails, which serve as hosts to the intermediate stages of the liver fluke. The freedom from rot of sheep which are feeding on salt marshes is well known, and is now shown to be due to the poisonous action of the salt on the embryos, *sporocyst*, *redie*, *cercaria*, and *cyst*, and to its similar action on *Linnaeus truncatulus* itself. Even a weak solution of salt and water ( $\frac{1}{2}$  per cent. of salt) proves fatal to this snail. Dressings of salt have the advantage over lime in not spoiling the grass for immediate use, whereas the latter will do so. It may, however, be better at times for the land itself that lime should be applied.

'There seems to be only this one snail in England which can serve as a host to the intermediate forms of the liver fluke. Consequently, wherever this snail is absent, there can be no liver-rot; and if we could succeed in exterminating it, we should render it impossible for the disease to exist in England.

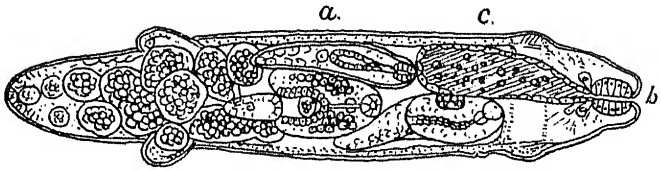
'It is naturally of much importance that salt or lime should be distributed at the right time of the year, when fluke germs and snails are present in the greatest numbers. The snail buries itself in mud or soil in the winter time, and, owing to the cold, no embryos are hatched at that period.

'If the weather be warm in April, it is possible that a few may be brought out towards the end of the month, but they will not be numerous. In May, however,

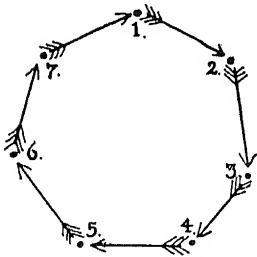
greater numbers may be hatched, and still more in June and July. These two months are the time of the year when the country is most liable to be infested by snails. As more eggs are distributed through the whole of the summer by fluked animals, it is clear, of course, that the production of embryos, though in less numbers, will continue from August until the time when the development is checked by autumnal cold. June and July, then, are the principal, but not the only, months in which we are to wage war against the embryos; the latter part of August, September, and October, are the months in which especially to destroy the germs on the grass ready for transference to the sheep.'

312. In the autumn, the snail *Limnaeus truncatulus*, just before going into its winter-quarters—i.e., burying itself in the mud—may become infested with one or more embryos, and, for the want of heat, their further development is arrested until spring, when the rays of the sun bring the snail to the surface of the ground, and the various transformation stages of the embryo fluke is then carried on, always provided heat and moisture are present. This, to my mind, is the greatest cause of the infection. The eggs deposited by the mature flukes in the liver, and again deposited on the ground in the winter months, are in great danger of being destroyed by the want of heat to germinate the embryo, as well as by the absence of its intermediate host, the snail, which is in its winter habitat. Sometimes, however, too many embryos enter one snail, and this results in not only the death of the host, but in their own as well. As may be inferred from the foregoing extract, the disease is not so rife in dry seasons, but is very common after wet summers. Animals may be affected as early as midsummer, but August, September, and October are the principal months for contamination; and as it takes ten or twelve weeks after the entrance of the *pupa* into the liver before any bad effects are noticed, December, January, and February are therefore the chief months in which flukes are to be seen fully matured. The fluke has been proved beyond all doubt to be a fresh-water creature, and, as mentioned previously, the disease is never met with on salt marshes. Therefore, the land should be dressed in autumn and spring with salt, the first application being to destroy the snails before they seek their winter shelter, and the latter to annihilate any who may have escaped the previous dressing, as they come to the surface of the ground; even a weak solution—viz., 1 ounce of salt

# PLATE XXV

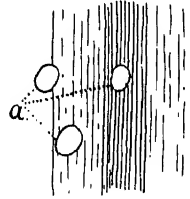


A Fully-developed Redia, showing—  
*a.* A Young Redia. *b.* The Mouth. *c.* The Stomach.



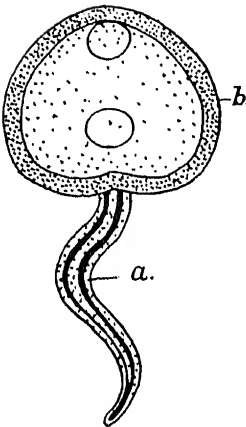
Represents the Life History of the Liver Fluke.

1. The Fertilized Egg. 2. The Ciliated Embryo. 3. The Sporocyst. 4. The Redia. 5. The Cercaria. 6. The Encysted Cercaria (Pupa). 7. The Full-grown Fluke.



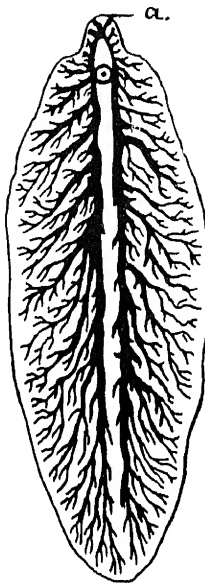
A Portion of Stem of Grass, showing—

- a.* The Cysts fixed to the same, each Cyst containing the Pupa of the future Liver Fluke ready to be swallowed by sheep.



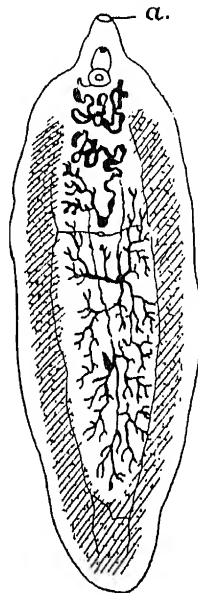
A Cercaria of Liver Fluke, showing—

- a.* The Tail, by which it swims. *b.* The Cyst or Envelope.



A Full-grown Fluke, showing the Digestive System, and—

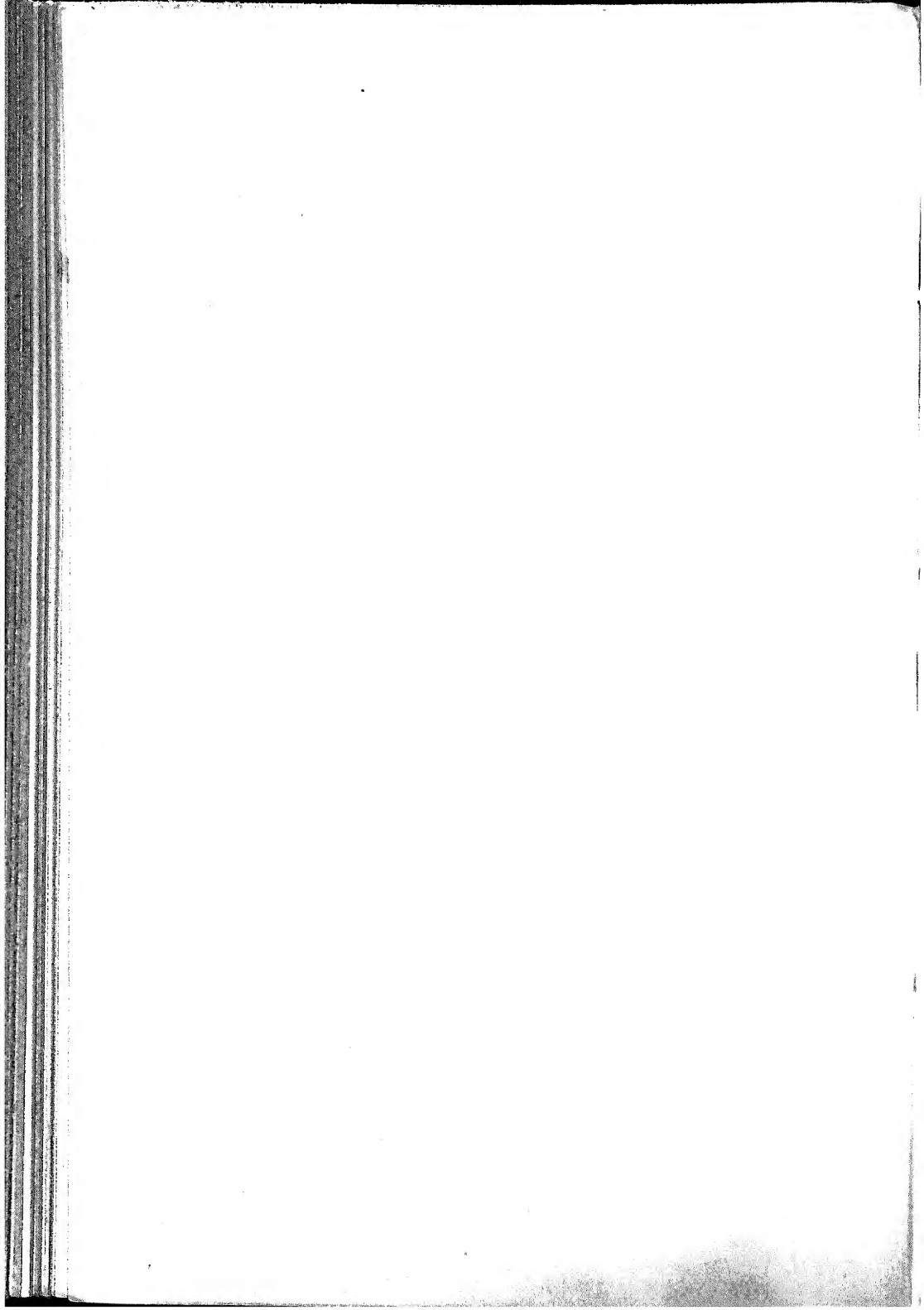
- a.* The Mouth.



An Adult Fluke, showing the Reproductive Organ as Branches, and—

- a.* The Mouth.





to 5 pints of water—proves fatal. Salt should also be given in the animal's food. These precautions should be especially attended to after wet seasons.

313. **Dysentery, or Bloody Flux**, is an inflammatory action of the lining membrane of the bowels, accompanied by ulceration, and, in some cases, with extensive diarrhoea of a thin, bubbly character, mixed with blood and having an offensive smell, and is both *acute* and *chronic*. It is mostly caused by eating coarse food, grown on undrained and moorland pastures. At one time it was of very frequent occurrence in feeding bullocks, but of late years has not been nearly so common. Sometimes neglected or chronic diarrhoea may run into this complaint, and at other times it is a symptom of *tuberculosis*. *Treatment*.—Small doses of linseed oil and chlorodyne should be given, and to these may be added from 30 to 60 drops of oil of cloves, creosote, or carbolic acid (*par. 1065, No. I.*). Good, nutritious, and easily digested food is highly necessary, such as milk and linseed jelly to drink two or three times a day. As a rule, however, treatment is very unsatisfactory, yet I have had good results from the salt and iron medicine (*par. 309*).

314. **Peritonitis** consists of inflammation of the serous membrane, called the peritoneum, which lines the inside walls of the belly and covers the outside of the bowels, and also forms the net or mesentery. Injuries—the results of foaling, calving, lambing, or castrating, and wounds penetrating the abdominal cavity—are the principal causes of peritonitis, while, at times, it occurs without any appreciable cause whatever. This disease steals on so insidiously that the affected animal is generally at death's door before much notice is taken of it. This is especially noticeable in the horse, which generally dies in a few hours after being noticed. But the cow may linger on for a few days, having a dull, anxious look, with eyes red and suffused, hurried breathing (which is mainly done by the front ribs), moaning and grinding of the teeth, trembling of the limbs, and deathly coldness pervades the whole body. The animal, as it were, bleeds to death, owing to the watery portions of the blood oozing through the walls of the bloodvessels into the abdominal

cavity, which, on post-mortem examination, is found to contain a large quantity of straw-coloured fluid. When the disease is discovered hypodermic injections of morphia should be given, and cloths wrung out of hot water rolled round the body, covering these again with dry rugs and waterproof sheeting (*par.* 249).

315. **Dropsy, or Ascites**—*i.e.*, dropsy of the belly—may arise from *peritonitis*, from disease of the liver and bloodvessels, from *tubercle*, and other causes. It is not of common occurrence. The chief symptoms seen are enlargement of the belly, with swelling of the limbs. Good, nutritious food, with iron tonics and diuretics, should be resorted to (*par.* 1073, *Nos. I. and III.*), while, in some cases, it is necessary to 'tap' the animal.

316. **The Liver** (*Plate XVIII., B*) is a large, reddish-brown, glandular body, situated between the stomach and diaphragm, and held in its position by ligaments. It possesses four lobes in the horse and two distinct lobes in the cow, and is covered by a coating of peritoneum, called *Glisson's capsule*. The substance consists of small lobules, made up of cells, arranged like a cart-wheel, between which the capillaries run. The cells take out from the blood certain materials for the formation of bile. The bloodvessels of the liver are—

- (1) The *hepatic artery*, which supplies it with nutrient blood.
- (2) The *hepatic vein*, which conveys venous blood back to the heart.
- (3) The *portal vein*, or functional vessel, which brings the blood, charged with absorbed material, from the stomach, spleen, pancreas, and mesentery. From this latter source portions of the bile elements are extracted, and the bile manufactured by the liver cells is then carried by the biliary tubes to the gall-bladder, and from thence by the hepatic duct which opens into the small intestine, close to the stomach. All animals, with the exception of the horse and rat, have a bag, called the **gall-bladder**, for the purpose of collecting and storing the **bile**—a viscid, greenish-yellow, and bitter fluid. Bile assists in the digestion and absorption of the nutrient material

in the intestines; it also increases the peristaltic action of the bowels.

317. The liver is the largest organ of the body, but, while frequently the subject of a great amount of disease and disorder in human beings, it is, happily, not nearly so subject to derangements in the domestic animals. Like all other parts of the body, it is liable to inflammation. The symptoms are not very well defined, and diagnosis has to be arrived at by negative results. Such cases should always, therefore, be entrusted to professional care. Occasionally, on making a post-mortem, enormously enlarged livers are found, both in horses and cattle, which ailments the animals, when alive, gave no indications of. Sometimes, however, these enlarged, or *hypertrophied*, livers are accompanied in the horse by dropsical swelling of the legs and shortness of breath; while in cattle the brisket, under side of the neck, and lower jaw become filled with a watery effusion. This latter symptom is also seen in traumatic heart disease in cattle. When cattle are heavily stall-fed with fancy foods, too highly seasoned with aromatic flavouring, and containing an excess of *amylaceous* matter, such as damaged rice, starch, sugar, etc., or where there is a preponderance of carbonaceous over nitrogenous principles—in other words, a badly balanced food—the liver is apt to undergo *fatty degeneration* or *fatty infiltration*. In the former the liver cells become changed into material of a fatty nature, while in the latter fatty globules are deposited in the cells. These cases may be *subacute* or *chronic*. *Symptoms*.—The animal refuses its food, drinks large quantities of water, and soon becomes greatly emaciated, but rarely hide-bound (although the hair looks staring and on end), and is affected with a lead-coloured, exhaustive, and stinking diarrhoea. *Treatment* is very unsatisfactory, a fatal termination usually supervening. Chloride or bromide of ammonia, with carbonate of soda,  $\frac{1}{2}$  ounce each, night and morning, may, however, be tried. The liver is liable also to *rupture*. This may be occasioned by engorgement and congestion of the portal vein, but in the horse it is more often due to the effects of falling in jumping. As a rule it proves fatal. In these cases the mucous membranes become pale

and blanched; there is a running-down pulse; then muscular twitchings supervene, the legs and body get icy cold, and death soon follows. The liver is also a frequent seat of tubercular deposits, abscesses, and tumours, as well as atrophy.

318. **Jaundice**, or 'yellows,' arises from many causes, but is generally looked upon as a symptom of some derangement of the liver, such as congestion, obstruction in the bile-ducts, loss of tone, and consequently inability to secrete the bile. **Congestion** is one of the most frequent liver disturbances met with in horses and cattle. It generally occurs in hot, dry seasons. The animal becomes sluggish, languid, and lazy, drops the head, loses the appetite, but evinces no pain. The pulse is full, slow, and soft; eyelids and gums of a dirty yellow or orange colour; tongue furred; breath foetid; bowels costive; faeces of a light slate colour; while in some cases in the horse the animal goes lame on one fore-leg, usually the off (right) one. Cattle are, however, more subject to this complaint than the horse, and the dirty yellow or orange colour can be readily noticed in the corner of the eye or inside of the ear, on the udder, under the tail, and, indeed, on any white part of the skin or any visible mucous membrane, particularly the vagina. The belly is flat, the appetite bad, and the animal rarely chews the cud. *Treatment*.—A good dose of opening medicine should be given at first. One drachm of calomel, suspended in from  $1\frac{1}{2}$  to 2 ounces spirits of nitre, and 1 pint of linseed oil may be given with advantage, either to horses or cattle, followed up by alkaline and vegetable tonics (*par. 1073, No. IV.*). Cattle also occasionally suffer from the presence of the dead bodies of the liver fluke which have undergone calcareous degeneration, and fill the bile-ducts of the liver with incrustations, accompanied by enlargement of the gall-bladder and a thickening of the walls of the bile-ducts, rendering the liver hard and gritty, and thereby interfering with its function. *Symptoms*.—A general yellowness is seen all over the body; the skin is tight and scruffy, with gradual wasting away of the flesh; the appetite and action of the bowels are both very irregular, and the animal has all the appearances of a pinner or a tubercular patient. *Treatment* is of little avail,

and if not slaughtered early the animal dies from inanition. Alkaline tonics can be tried, with daily doses of 1 wineglassful of cod-liver oil given in milk.

319. **Gall-Stones.**—These are extremely rare, either in horses or cattle. Some years ago I had a case at the late G. T. Carr's, then at Silloth Farm, Cumberland, the subject being the hunting sire 'Best Returns.' It commenced with all the indications of subacute inflammation of the bowels, with severe colicky pains. The acute symptoms were got over, and the case settled down into a chronic form, and for fully five or six weeks the bowels were very irregular—sometimes slightly purged, and at others only costive, dry, hard, prinrose-coloured pellets being excreted. At length it was seized with all the symptoms of uræmic poisoning, the head being pendulous and oscillating; fore-feet stiffly pushed forward, and legs occasionally bended at the knees; hind-legs placed wide apart; pulse very full, with slight colicky pains, and if made to move, it tumbled against the side of the box, which had to be padded with sacks of straw. Bleeding had a wonderful effect, and was frequently resorted to; in fact, it was the only thing which gave any relief. At last it was found dead in the box, and the post-mortem showed a gall-stone of a beautiful chrome-yellow colour, about the size of a pullet's egg, situated in the hepatic duct, close to its opening into the intestine. It was made up of concentric layers of a very delicate nature, which fleeced off on the slightest touch.

320. Liver complications are more common *in the dog* than in any other of the domestic animals, more particularly the overfed petted dog, that is being continually stuffed on sweet and fancy foods, which are apt to set up various derangements and diseases of the liver, such as congestion, enlargement, hardening, scirrhus, etc., and which creep on very insidiously, being frequently accompanied with asthma and shortness of breath. *Symptoms* of the different forms of liver complication in the dog are not well defined. The first symptom generally to be noticed is that the skin and coat begin to look dry and harsh, the mouth and the tongue lose their bright rose colour, the breath becomes fœtid, and the eye is dull and sleepy-look-

ing, while the teeth are dirty. The appetite, however, is fair, yet the dog loses flesh, and the belly becomes enlarged and hard, while there is nearly always present a peculiar barking, long, husky cough. *Treatment*.—First all fancy foods should be stopped and a plain diet given, such as dog-biscuit steeped in soup, feeding twice in twenty-four hours, and giving gentle walking exercise. For medicine, mix 1 drachm each of blue pill, powdered aloes, and powdered rhubarb, and make into twelve pills, and give one every third or fourth day. This dose is for an ordinary-sized collie dog; other doses should be regulated according to age, breed, and size of dog.

321. **Pancreas**.—I have never as yet met with any disease of this organ, either in post-mortems or otherwise, except in tubercular disease.

322. **The Spleen, Milt, or Cat-Collop** (*Plate XVIII., E*), is situated on the left side of the larger curvature of the stomach. It has a bluish-grey, mottled appearance (in the pig slightly red), shaped like a sole, and is very soft and elastic. It is ductless, having no channel for the removal of its products, except by means of the bloodvessels. Its proper functions are not exactly known, though several are ascribed to it. Still, it can be done without, as cases are on record where the spleen has been successfully removed from dog and man without causing death, or, indeed, much inconvenience, so long as the diet was properly attended to. My opinion is that it acts as a reservoir for the old worn-out red corpuscles which have done their duty in the blood. These, rushing to the spleen during digestion, are broken down, disintegrated, and carried by the splenic vein into the portal vein, thence to the liver, and help to form bile (see Lecture VIII., 'Circulation'). The spleen is supplied with blood by the splenic artery—a branch of the **cœliac axis**, which is a large artery that arises from the posterior or abdominal aorta, just after it passes through the diaphragm. This artery divides into three branches: (1) The *gastric artery*, supplying the stomach; (2) the *hepatic artery*, supplying the liver; and (3) the *splenic artery*, which supplies the spleen with nutrient blood. Although the spleen can be done without, it is a very dangerous organ when diseased. Some-

times, in the horse, it reaches an enormous size, without, however, showing any appreciable symptoms during life. *Fig. 6, page 158*, is from the photo of the spleen of a horse that was slaughtered after a long and wearisome illness. The animal had been ailing for months, and unable to work, and although feeding fairly well, it gradually lost flesh. Spleen disease was suspected, and, after slaughtering, the organ was found of an enormous size and studded all through with tubercular nodules of various sizes.

323. **Lymphadenoma.**—This is a peculiar disease of the spleen in the horse. The symptoms are very remarkable: the animal feeds well, but gradually loses flesh; has a dingy, staring coat and a staggering, swinging gait. The visible mucous membranes, such as eyelids, etc., are as pale as white paper; the pulse is soft and quick, varying from 80 to 90 per minute; the bowels, as a rule, are quite normal. The animal lingers on for some considerable time, having to be supported on slings to keep it on its feet. These cases are invariably fatal, the post-mortem showing the presence of pearly-white tumours of lymphoid tissue, and varying in size from that of a marble to that of an orange, made up in concentric layers which are studded through the spleen, while at times the lymphatic glands are also implicated. *Treatment* is of little avail, but 1 drachm each of iodine and sulphate of iron made into a ball and given once a day till eight doses are given can be tried, and repeated if necessary.

324. **Anthrax** is a specific disease of a very inoculative and contagious character, caused by the presence in the blood of a spore-bearing organism, the *Bacillus anthracis*. From time immemorial outbreaks of anthrax have been recorded by celebrated men in various parts of the world at different periods. *Anthrax* or *splenic apoplexy* as it affects cattle is known by the name of *malignant pustule*, or *woolsorter's disease*, in the human subject. Other terms are also applied to the disease, such as *charbon*, *carbuncular fever*, *gloss anthrax*, *malignant sore throat*, etc. In South Africa it is called *horse sickness*, in America *Texan fever* and *splenic fever*, and in India *Loodiana disease*. It is very remarkable to observe how solitary cases of anthrax break out in this country, arising, as they do, under such



a variety of conditions. For instance, the process of fermenting hay-chop, if not properly and carefully carried out, my experience shows to be very dangerous. This process consists of saturating chopped hay with cold water, or cold water and treacle, mixing it with sliced turnips, and letting the mixture lie until fermented—that is, until the starchy matters have been converted into their sugary form. Should this, however, be carried too far—viz., through the sugary to the acetous stage (and this is easily done by leaving some of the old chop and mixing it with the new—a little leaven leaveneth the whole lump)—and the cattle be fed on this for any length of time—a fortnight, or even less—bad results generally follow, more particularly if some food rich in nitrogen, such as decorticated cotton cake, has been added to the mixture. I have, on several occasions, known anthrax to have followed this method of preparing the food and feeding, and, on changing the food to a simple diet, the malady was always arrested. On other occasions anthrax followed the feeding of cattle with overmacerated cummings, left too long exposed to the action of the atmosphere, when they were rendered as sour as vinegar. Whether the method of manipulating the food renders it into such a condition that when eaten it has some peculiar action on the fluids and solids of the body, whereby they are converted into a suitable pabulum, or seed-bed, favourable for the entrance and development of the spores of the disease, or whether the spores are in the foods and are roused into activity by the methods of preparation, I am unable to say. Again, on the other hand, several outbreaks have also occurred in my district on undrained pasture-lands. On one occasion, in 1862, the complaint broke out amongst twenty-five two-year-old short-horn heifers, of which six died in two days, and they were only ailing from two to four hours; the remaining nineteen were removed to another pasture, and each one got a dose of medicine, composed of 6 ounces each of common salt and Epsom salts and 2 ounces of ginger in 1 quart of thin gruel. A few days after sixteen of the heifers took red-water, but they all eventually did well, and the disease spread no further. The land on which this outbreak of anthrax occurred had been noted for generations as a hot-bed for red-water in cattle. For twelve years after red-water was prevalent, but no anthrax.

In 1874 the pasture was dressed with 8 hundredweight crushed rock-salt to the acre, and again in 1880 it got another dressing, *but no cases of red-water or anthrax have been seen since the salt was first applied.* I have also seen a number of cases of anthrax, the cause of which was set down to eating mouldy cotton cake, particularly undecorticated, which should never be stocked during the months of June to September, for it is very apt to mould, and is then highly dangerous, and it is just possible that the anthrax spores (seeds) may have been lying latent in the mouldy cake, and brought into activity on consumption by the cow.

325. As already stated, this disease is due to the *Bacilli anthracis* (minute rod-like bodies); yet these little organisms are not found in the blood until an hour or so before death, although they may be present in the spleen and other internal organs. The bacilli, or rods, as seen in a fresh unstained drop of blood under the microscope, are noticed to vary in length, being estimated to be from  $\frac{1}{1700}$  to  $\frac{1}{2000}$  of an inch long and  $\frac{1}{25000}$  to  $\frac{1}{30000}$  of an inch broad, but with rounded ends, and having all the appearance of minute splinters of glass mixed amongst the blood corpuscles. When stained with methylene blue the rods are readily seen like small portions of black thread amongst the corpuscles. The anthrax bacilli, being aerobic, require for their development and growth a large quantity of oxygen, and in the living body they multiply by transverse division or fission—breaking into two—increasing with great rapidity, and thus robbing the blood of its oxygen, which becomes watery and dark coloured, and the bacilli crowd into the minute bloodvessels—the capillaries—block them up, and the animal dies suddenly, as if suffocated for the want of oxygen. When experimenting outside the body, and the bacilli are placed in a suitable nutrient material and at a proper temperature, they develop very quickly and form a sort of chain-like filament, and, when supplied with oxygen, generate spores or seeds for the next generation; and as an illustration, a pea-pod full of peas may be taken, the pod being likened to the bacilli, while the peas resemble the spores or seeds. As the spore formation also requires a large quantity of oxygen, it rarely takes place inside of the body;

but when an animal that has died from anthrax is skinned or opened into, and the blood and tissues exposed to the action of the air, spore-development readily takes place, and as they are the real seeds of the disease, it is, therefore, dangerous to open the dead body of an anthrax subject—it tends to spread the malady. However, should the body be buried intact, in the space of from three to five days after death, the *putrefactive bacteria* of the body destroys all the existing anthrax bacilli, and further danger is averted. The bacilli themselves can be destroyed by excess of heat or cold, or chemical agents, but the spores are difficult to deal with; they can withstand almost any amount of heat or cold, and can lie for years in the soil without their virulent nature being affected.

326. *Symptoms*.—Cattle are more frequently affected with anthrax than any other animal; the disease may be per-acute, acute, or sub-acute. The **per-acute**, or apoplectic form, is very sudden in its action: the animal becomes suddenly ill, staggers and tumbles about, with occasional bloody discharge from the nose, mouth, and rectum, and may die in the short space of an hour in convulsions. These are the cases that are usually seen apparently all right, say the last thing at night, and found dead in the morning. The **acute** form is not so pronounced, and generally occupies three or four hours before running its course. When observed, the animal is noticed to be very uneasy, trembling all over, breathing very fast with a loud noise, mouth open, and saliva foaming from the lips, the beast shaking and reeling from side to side, and finally dropping down and dying suddenly. In some cases the throat is also swollen, this symptom being mostly observed in the pig. The temperature runs from  $106^{\circ}$  to  $108^{\circ}$ , and occasionally blood is seen coming from the nose and bowel. The **subacute** form is characterized by the animal being found standing very quietly and thoughtful-looking, hanging its head, with occasional trembling of the muscles, breathing fast, with tears running from the eyes, refusing all food and water, and the cessation of the secretion of milk when the subject is a milch cow. The temperature varies from  $104^{\circ}$  to  $106^{\circ}$ , diarrhoea may be present, and the animal, having all the appearances of a severe cold, may continue in the

same condition for two or three days and ultimately recover. It is only in these latter cases that there is any chance of recovery. When an animal is found dead in the byre or field, and very much swollen, with the rectum slightly turned out, and a bloody, watery discharge oozing from the various openings of the body, on no account should it be either skinned or opened into, as on examination of these discharges, from an anthrax subject, under the microscope they are found loaded with bacilli. In all such-like cases a drop of blood taken from the tail or ear should be microscopically examined, when the anthrax rods will be readily observed amongst the red

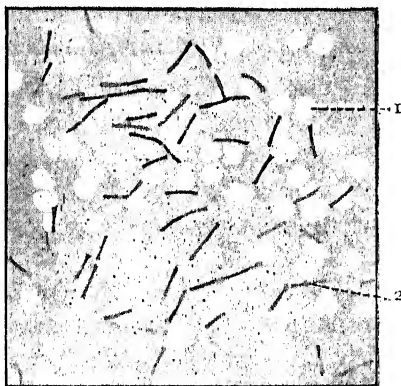


FIG. 11.--ANTHRAX BACILLI AND RED CORPUSCLES.

1. Red corpuscles of blood.

2. Anthrax bacilli rods.

corpuscles of the blood. This can be further verified by adding a little methylene blue to another drop of blood, when the dark rods, or the bacilli, will be seen (*see Fig. 11*). No time should then be lost in informing the nearest police officer of the case, while all the openings into the body of the animal should be immediately plugged up with pieces of cloth saturated with some disinfectant or tar and a sack pulled over the head, while the body must be protected from the approach of other animals. Should the carcass have to be buried, the hole must not be less than 6 feet deep, and dug in some remote place clear of drains and watercourses. A plantation makes

a capital burial-ground. The bottom of the grave should have a layer of lime mixed with carbolic acid spread over it, and all the bedding and other articles that may have been in contact with the diseased beast should be put into the grave along with the carcass, and then another layer of lime and carbolic acid spread on the top. By far the best way for disposing of the carcass of an anthrax beast is to burn it, and the bedding, also, and this method is now generally adopted by the local authorities.

327. It will thus be seen that the carcass of a dead animal should on no account whatever be disturbed until the cause of death has been ascertained; nor ought any beast, when found to be very ill, and apparently at the point of death, be slaughtered and dressed, as is too frequently done, because if it be a case of anthrax it is extremely dangerous to the men who take part in the work of skinning and dressing, and at the same time it tends to spread the malady by exposing the blood and flesh to the air, and thus favouring the development of the spores or seeds of the disease, which can be carried about on the clothes and shoes of the attendants, also on the feet of dogs, cats, poultry, vermin, etc., into and amongst the fodder and other feeding-stuffs; it can also be conveyed by utensils that may be lying about—these are considered to be the worst forms of spreading the contagion. Foreign cakes and meals and other feeding-stuffs, particularly those that have been damaged in transit, are looked upon with great suspicion, as are also foreign bones, hides, and wools, the latter being considered as highly dangerous in contaminating the vessels and vehicles by which they are carried. It is, in addition, recorded that the disease-producing spores are brought from the dead carcass of an anthrax beast that has been buried some years previously without any precautions being taken to disinfect the body, and deposited on the ground in the worm-casts, and thus contaminate the herbage. However, notwithstanding all these theories, there is only one real cause of anthrax, and that is the entrance into the body of a subject of the bacilli or their spores; that body must be, however, in such a condition as to favour the acceptance and development of the disease-producing organisms, and this state

may be induced by injudicious feeding with an excess of food of either too nitrogenous or too carbonaceous a character, a badly-balanced ration, and food not properly prepared or overfermented. It is, nevertheless, very remarkable that, in spite of all the foregoing causes, only solitary cases keep cropping up here and there; and when every precaution is taken to deal with the carcass, the disease seldom spreads, as anthrax cannot be looked upon as infectious—that is, healthy animals standing in close proximity under one roof, or in the same pasture, do not take the disease by inhalation. Anthrax occasionally makes its appearance in an enzootic form on low-lying, undrained, sour, marshy pastures that may be adjoining rivers subject to overflowing; these cases can only be accounted for by the spores being brought by the flood from an infected quarter and deposited on the grazing pastures.

328. *Treatment*.—When the symptoms are noticed and anthrax suspected, 4 ounces of hyposulphite of soda dissolved in a quart of warm water, with 1 ounce of tincture of ginger added, should be administered as a drench, giving 10 to 12 ounces of raw linseed oil and 2 drachms of British Pharmacopœia carbolic acid mixed four hours later, and repeating half the quantities of these medicines alternately every four hours until the bowels respond, offering at frequent intervals cold water or cold hay-tea to the animal to drink. This mode of treatment I have on several occasions found very satisfactory. As a rule all in-calf cows that have been affected with anthrax and recovered under treatment cast their calves (abort). *Post-mortem*, when the skin is removed from a beast that has died from anthrax a peculiar sickly, musty smell is given off, while the carcass is noticed to be of a yellowish-grey colour, and small drops of dark semi-fluid blood is noticed coming from the cut ends of the small bloodvessels, and the flesh and all internal organs, such as the heart, liver, etc., have a soft, half-boiled appearance; the spleen is very much enlarged, being eight to ten times its normal size, of a dark brown colour, readily broken through, and full of tarry-like semi-fluid blood; while the cavities of the belly and chest, bladder, etc., contain a dirty mud-coloured fluid. Regarding preventives, I have every confidence that

if the lands are well dressed with salt, and the animals given a table-spoonful of salt daily in their food, which should be properly prepared, this disease would in a great measure be prevented.

329. **Braxy, Sheep-Sickness, Strike, etc.**—Braxy may be looked upon as a morbid change in the tissues of the body and deterioration of the blood. From numerous investigations, experiments, and microscopic examinations by the late Professor Hamilton, M.B., F.R.C.S.E., of the Aberdeen University, and others, appointed by the Board of Agriculture and Fisheries, and according to the Report issued by them, there are several other complaints as well as wet, dry, and red braxy to which sheep are prone that are called braxy; it also appears that braxy proper is considered to be due to the presence of a disease-producing germ, and is of an enzootic character, having an extensive range in certain localities, making itself manifest at certain periods of the year, particularly in the later autumn and winter months, and attacking young sheep, chiefly under twelve months old. It is further stated that the specific bacillus—a spore-bearing germ—was discovered by Neilson in Norway in the year 1888, which discovery has been confirmed by Professor Hamilton in his extensive researches, who also considers that the Gulf Stream has some influence on the prevalence of the disease. The experts report that braxy in sheep, like louping-ill (*par.* 595), is due to small germs (bacilli) found in the cavity of the belly (peritoneal cavity) and inside of the bowels, and also in other serous cavities, as well as in the blood, but the braxy bacilli differs from all others by being very small and of a delicate outline. Apparently the disease is spread by the bacilli which infest the bowels being deposited on the ground in the excreta of an infected animal, and picked up with the herbage by healthy sheep. When the skin is removed from the dead body of a braxy sheep the carcass gives off a very peculiar odour (braxy smell), and when the flesh is pickled in the brine-tub and dried it is called 'brakshay,' and is much relished by many, having a somewhat venison-like flavour. The investigators found from numerous experiments that by preparing a soup from the disease-producing germs found in the cavity of the belly, and administering it to the lambs at a certain

time of the year, the animals were supposed to be rendered immune, and the disease prevented. The administration of this prepared soup has not, however, given such a satisfactory result as was anticipated, and the real pathology of braxy has still to be determined. The same investigators, however, found that at certain times of the year—July and August—the blood itself had a remarkable power of destroying the germs of both louping-ill and braxy, and this was the time of the year to dose the animals with the prepared soup in order to prevent them taking the diseases at the time when they were most susceptible to its influence—namely, from October to January. A favourite preventive of the malady with a large number of flock-owners is a preparation of the dung of pigs and skim milk, a wine-glassful of this being administered to each sheep in the third week of September; one dose is said to render the sheep immune from the complaint. Lump rock-salt or McDougall's health-licks placed on the pastures for the animals to lick give the most beneficial results—except dressing the grazing lands with 6 hundredweight crushed rock-salt to the acre.

330. In some seasons when sheep are first folded on turnips they are affected with sickness, which somewhat resembles braxy in its attack, and is very rife, the sudden change of food, and some peculiarity in the weather, having a powerful influence in producing it. When sheep are first put on roots, they should have a small quantity of hay, well watered with salt and water, or a little salt given daily with some crushed oats or maize and bran. Were these measures generally resorted to, there would be little, if any, fear of the sickness appearing. When the malady occurs amongst lambs on extensive mountain and hill ranges, lump rock-salt placed on various parts of the pastures will be found to have a very beneficial effect. *Treatment.*—As the disease runs its course so rapidly, there is little or no chance for medical treatment; if, however, the case should be noticed early, then 3 to 5 drachms of hyposulphite of soda dissolved in  $\frac{1}{2}$  pint of warm water, to which may be added 5 to 15 drops pure carbolic acid, and 1 to 2 teaspoonfuls of tincture of ginger can be given, and repeated in four hours if necessary.



331. **Mesenteric Disease.**—The mesentery, or net, particularly in well-bred cattle, is often the seat of abscesses, or tumours, of a *tubercular* nature, and such animals go under the name of *clivers*, *piners*, etc. The skin has a dirty yellow, scurfy appearance, very tight on the body, and hide-bound; there is also great emaciation and, as a rule, diarrhoea. Little can be done in these cases, medicine having little or no effect. Sometimes, however, on the first appearance of this disease, from 10 to 25 drops of strong sulphuric acid in 1 pint of cold water may be serviceable, along with a wineglassful of cod-liver or linseed oil daily. The most profitable plan is to test the animals with tuberculin, and although they react, in some cases this has a marvellous action, the disease is arrested, and the animal commences to improve and get well; but should this not take place, then make away with them. *Milk from such animals should never be sold or used.*

332. **Calves.**—As already stated, the fourth stomach is the largest in the calf, on account of the young animal living principally on a milk diet. The first, second, and third compartments are not required to prepare the food until the animal begins to eat hay, or other rough material. The fourth stomach of the calf contains the acid juices (the *rennet*, used in cheese-making), which have the property of coagulating milk. This fact is of great importance in the feeding of calves, showing that they should be fed frequently and with small quantities for the first fortnight, at least. They ought not to be fed less than four or six times a day, although most farmers feed them only twice a day, giving large quantities at once. This practice is much to be condemned, for, as soon as the milk comes in contact with the walls of the stomach, it is coagulated, or curded, this being the first process of digestion. The weak digestion of the calf is quite unfitted for disposing of a large bulk at a time, and perhaps some of the old curd is still in its stomach when next fed. This sets up irritation and inflammation of that organ, which Nature tries to relieve by means of diarrhoea, called *white scour*.

333. **White Scour** is a discharge from the bowels of a dirty white or yellowish coloured watery fluid, and due to the presence of

a disease-producing organism, and of a very infectious and contagious character, being readily carried by an affected calf from one building to another—a complaint which carries off a large number of calves yearly, and when once established is difficult to deal with, running through the young stock in many cases like an epidemic, varying in degree in accordance with the severity of the attack and the constitution of the animals, making itself manifest in three different forms. The late Professor Nocard, the noted French savant, in conjunction with Professor Mettam, when inquiring into the great mortality amongst the calves in Ireland in the year 1901, reported that the malady *white scour* in calves was caused by the presence of a microbe which Professor Nocard isolated from numerous other microbic germs, and named it *pasteurella*; he also proved by direct experiment that *joint-felon* (septic arthritis) was due to the same cause, and that the germ gained admittance into the body of the calf at its birth through the medium of the navel cord, which is made up of four vessels (*par. 760*). In many cases, a few weeks after the calves recovered from the diarrhoea, they were noticed to be affected with a bad cough, accompanied by a gradual loss of flesh, general debility, and eventually death, and the post-mortem showed the lungs to be highly inflamed and consolidated. This form of the complaint I have frequently met with in my practice.

334. *In the first or catarrhal form* the malady is of a most virulent type, attacking the young calves immediately they are born, and running its course in from three to twenty-four hours. In many instances the calves die before ever getting a drop of milk, giving the impression that they bring the disease into the world with them; they pass from the bowel with great pain and straining a most irritating fluid of a hot, bloody, watery nature. *In the second form*, calves with stronger constitutions and a less severe attack show no signs of the complaint until about the time the fifth or sixth meal of milk is offered, which the little animals refuse, and a yellowish bilious discharge is ejected from the bowels, and within a few hours the calves will be found lying stretched out and greatly depressed, with eyes closed, mouth and body cold, breathing very

catchy, and finally death closes the scene. *In the third form* the attack is of a much milder character, the calves being affected several days and then recovering. Cases in the second and third forms are at times greatly aggravated by injudicious modes of feeding, giving big doses of milk at the end of each day instead of lesser quantities four or five different times within the twenty-four hours. The calves should be fed from an india-rubber foster-mother, and suck the milk instead of drinking it.

335. *Treatment*.—In the first or intestinal catarrhal form the attack is so severe that little can be done; 2 teaspoonfuls of Cond's Fluid, mixed with  $\frac{1}{2}$  pint of skim milk and warm water, can be tried, and repeated in five or six hours if required. In the second and third stages sometimes 2 to 3 ounces of castor oil and 1 to 2 teaspoonfuls of laudanum mixed and given as a drench in a little warm milk, when the animal is first observed ailing, answers well, following up with 1 wineglassful of lime-water, or 1 teaspoonful each of carbonate of soda or salicylate of soda added to the morning and evening meal. Should the diarrhoea be very bad, give as a drench in a little warm milk 1 tablespoonful of Gregory's powder (*par. 1065, No. III.*) and 1 teaspoonful of laudanum night and morning, the milk fed to the calves to be twelve hours old with the cream removed, warmed in a water-bath, and offered to the ailing animals every five or six hours in small quantities. The calf huts and boxes should be at once thoroughly cleaned out, the walls and wood-work washed with boiling water, washing-soda, and carbolic acid, following this up with lime-wash and carbolic acid, sprinkling the same on the floor; this ought to be done once a fortnight or three weeks until the complaint is arrested. *Prevention*.—Immediately the calf is born tie the navel string with a piece of cord or narrow tape previously dipped in carbolic oil (*par. 1060, No. III.*, or iodine solution, *par. 1069, No. V.*), then rub a little of the oil or iodine solution over the belly and around the navel, and above all put the calf into a good dry box on to clean dry bedding, and for the first week feed every six hours with twelve-hours milk (from which the cream has been removed) warmed in a water-bath. Attention

should also be given to the food of the cows, and if decorticated cotton cakes or other highly nitrogenized foods are being used, they should be stopped for a few weeks before and after calving, and crushed oats, brewers' grains, Indian meal, and bran used instead. The nitrogenous matter in cotton-seed cakes causes the milk to be of too stimulating a nature for a young calf's system to assimilate.

336. **Hair and Wool Balls** are accumulations of hair or wool in the stomach of the young calf and lamb. They may be caused by the animals licking and sucking one another, by which means a quantity of hair and wool is drawn into the mouth by the tongue, whence it is passed on to the stomach, where, by the churning motion of the stomach, it becomes matted and formed into balls. Another cause is that of giving the calf unstrained milk, which is a great mistake. Milk given to calves should always be put through a strainer. When these balls are present, they cause a good deal of derangement, with impaired appetite and a puffing up or swelling of the left side. Should the swelling occur several times daily, the best plan is to make the animal into veal or lamb as soon as possible, or the stomach may be cut into and the offending ball removed. Occasionally a calf may recover, in which case the ball or balls, highly polished, are found in the paunch of the adult animal on slaughtering, having been a frequent cause of tympanites during life.

337. **Navel-III** is a septic inflammation of the navel string, with suppuration, caused by small germs infesting the navel opening, and a common complaint in young foals, calves, and lambs up to a week or fortnight old. The animal appears dull and listless, lies stretched out flat on its side, refuses its milk, and breathes fast and catchy, perhaps moaning. On examining the navel it will be felt to be hard and swollen. It should be laid open with the knife, and dressed with carbolized oil or iodine solution (*par. 1060, No. III.*, and *par. 1069, No. V.*); a flannel folded five or six ply thick, wrung out of hot water, should then be applied to the navel, and kept in place with a bandage round the body. Tablespoonful doses of Gregory's powder or magnesia may be given daily. *Prevention.*—Dress the navel string as per instructions given under White Scour.

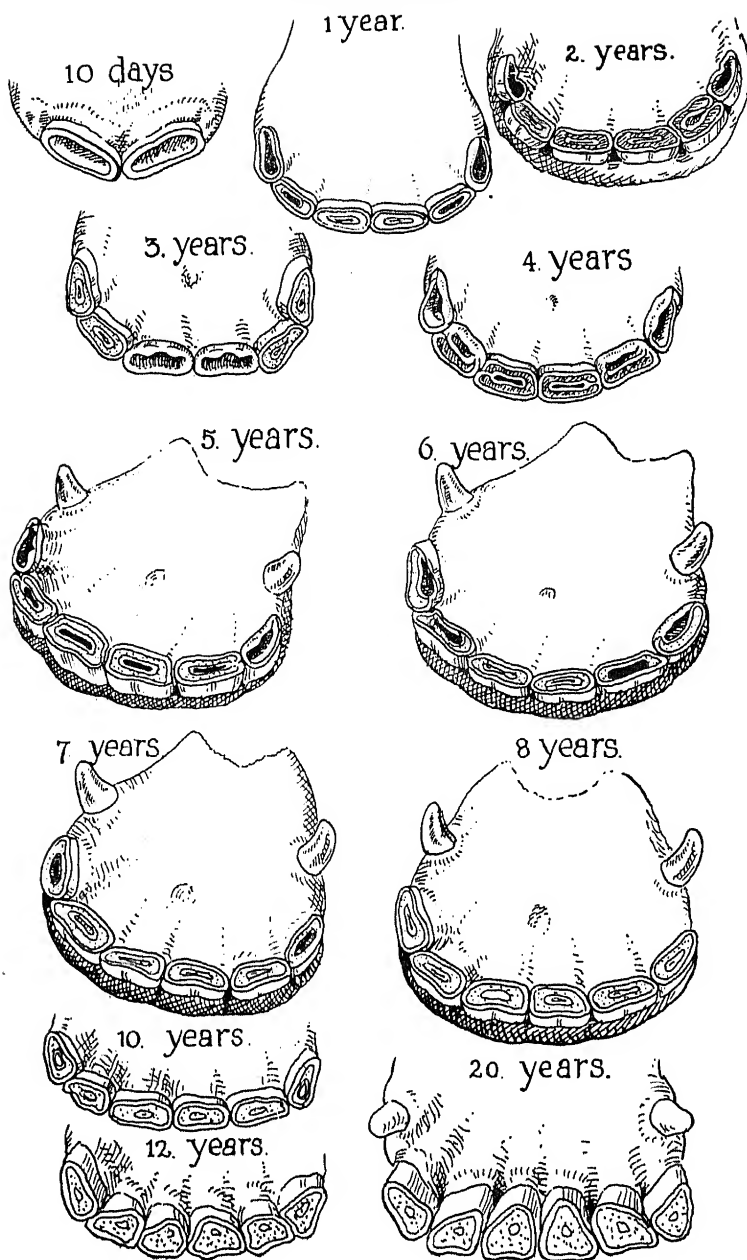
338. **Joint-Felon**—a septic inflammation of the joints. The knee, hock, and stifle are the joints most frequently attacked by its baneful action, and it is usually noticed a few days after birth. A large number of young animals are yearly lost from this disease. The patient is very feverish, and unable to stand when put on its feet, while, on being made to move, lameness is noticed in one or more of its limbs. There is enlargement of the joints, accompanied by great pain on pressure being applied. As a rule the disease is fatal. On opening the diseased joints, they are generally found to contain a quantity of *sanious* brown stinking fluid, in which are shreds of tissue. The disease is due to septic material being carried into the system through the four vessels that form the navel string (*par.* 760), which in most cases are found to be open, and from which there is a slight discharge of thin watery fluid; consequently, as a preventive, I strongly recommend that at all times the navel string be tied immediately after birth with a piece of cord dipped in carbolized oil or iodine solution (*par.* 1069, No. V.), or a waxed thread as used by shoemakers; above all, the box in which the mare foaled, or the cow calved and cleansed, should be thoroughly washed out with water containing carbolic acid. Clean dry bedding is an absolute necessity. *Treatment* is extremely unsatisfactory; rubbing the affected joint with 3 ounces each of essential oil of camphor and soap liniment and 2 ounces of liquid extract of belladonna mixed, and a little applied twice a day, 1 to 2 drachm doses of hyposulphite of soda, with 5 to 10 grains of sulphate of quinine added and given in a little milk or water, every six or eight hours, answers as well as anything I have tried.

### SHEEP.

339. Many of the ailments affecting the digestive organs of the cow are seen in the sheep, and the *treatment* is somewhat analogous, only the medicine used must be about *one-fourth* less than what is given to the cow.

340. There is, however, one very complicated affection that deserves special attention, and that is *verminous* or *parasitic bronchitis*, or *hoose*, accompanied by *diarrhœa*, or scour, and known in some parts as *paper-skin*. The *diarrhœa* has already been described (*par.* 309),

PLATE XXVI





and the *hoose* will be further noticed in *par.* 548. This complicated disorder is mostly seen in lambs that have been moved from one place to another during the months of August and September, and generally makes itself manifest in and from October till December. The disease is due to the presence of the *Strongylus filaria*, a small white thread-like worm found in the wind-pipe and bronchial tubes, causing *verminous* or *parasitic bronchitis*, accompanied by *hoose* or cough. These worms, when numerous, are quite sufficient in themselves to cause death, setting up, as they do, inflammation and consolidation of the lungs; but when accompanied and complicated by the presence of other worms—*Strongylus contortus*—infesting the lining membrane of the fourth stomach and bowels, and setting up an extensive and exhaustive diarrhœa—*i.e.*, scour—the matter is then very serious. This complication causes great pain and induces the affected animals to drink large quantities of water, there is rapid emaciation, and death soon follows.

341. The lambs pick up the ova or eggs of these worms on unsound or contaminated pastures, and a few hours is quite sufficient to infect a whole flock. This is a matter of vast importance to both seller and buyer, as both may have good sound grazing lands, and yet the lambs may contract the malady in transit from one place to the other by being put on to an unsound grazing pasture for a few hours' rest on their journey, particularly in August and September. *Treatment* must be energetic so as to kill the worms in the lungs; for this purpose, fumigations of sulphur, chlorine, or iodine fumes can be used. The stoving should be repeated about every third or fourth day, while the strength of the patient must be maintained by good, nutritious, and easily digestible foods, such as linseed jelly, milk and eggs, gruels, etc., to which should be added 10 to 15 grains of exsiccated iron and 1 dessert-spoonful of common salt once a day, also a dessert-spoonful of turpentine, mixed with 1 teacupful of raw linseed oil or 1 wineglassful of cod-liver oil, and a little milk may be carefully given as a drench every third or fourth day. The lands on which the lambs have contracted the disease should also be dressed, in June or July, with 6 to 8 hundredweight crushed rock-salt to the acre, to destroy the ova and their hosts.



## LECTURE VII

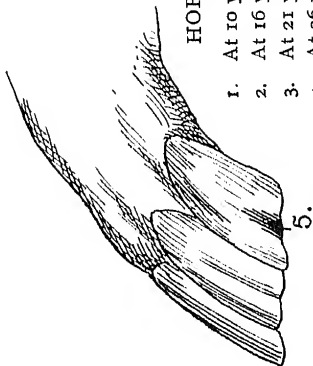
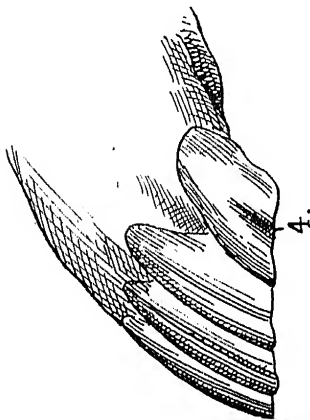
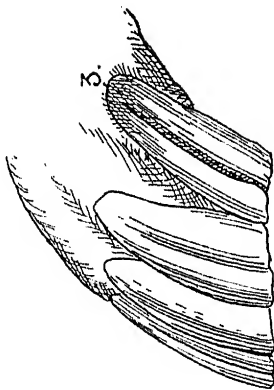
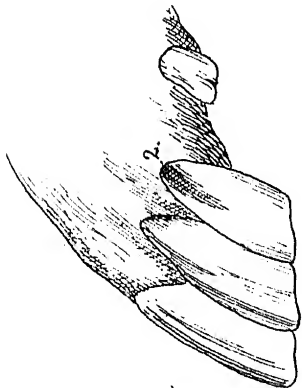
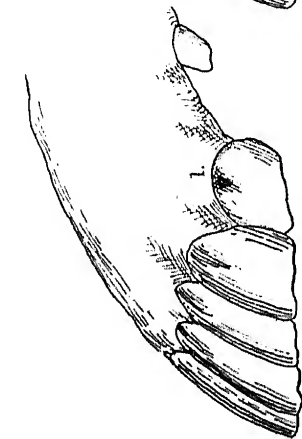
### THE DENTITION OF HORSES, CATTLE, SHEEP, PIGS, AND DOGS, AND DENTAL DISEASES

342. **Teeth** are the principal agents in mastication, and, although composed of the hardest structures in the body, are, in the first instance, developed by a very interesting process from one of the softest structures—the mucous or lining membrane of the mouth.

343. **The Tooth** is divided into the **crown**, **neck**, and **root**, and is made up of three structures—*ivory*, or *dentine*; *enamel*; and *cement*, or *crusta petrosa*. The **dentine** is whitish-yellow in colour, and forms the bulk of the tooth. It is found in the middle, in contact with the pulp, and consists of about 72 per cent. earthy matter and about 28 per cent. animal matter. The **enamel**—the hardest substance of the three—is of a pale bluish-white, and contains 95 per cent. earthy and 5 per cent. animal matter. It acts as a protection covering the external parts of the crown, and is interspaced in irregular curves between the *dentine* and *crusta petrosa*. The **crusta petrosa** is yellowish-white, and found on the outside of the tooth, in connexion with the root, or fang, and is softer than either the dentine or enamel; in fact, it is the bone of the tooth, and is composed of 67 per cent. earthy and 33 per cent. animal matter.

344. There are two sets of teeth—viz., **Temporary**, or **Milk Teeth**, which are much *smaller* and *whiter* than the second set, the **Permanent** (*see par. 348*).

# PLATE XXVII



## HORSE'S TEETH AT DIFFERENT AGES

1. At 10 years, Groove in Upper Corner—Incisor Tooth.
2. At 16 years.
3. At 21 years.
4. At 26 years.
5. At 30 years.



## HORSE.

345. The horse, when full-mouthed, has forty teeth, as follows: Twelve incisors, six above and six below; four canine teeth, or tushes, one on each side of the upper and lower jaw (the mare has no canine teeth); twelve premolars, three on each side above and below; and a like number of molars similarly disposed.

346. The marks on the crowns of the **lower incisors** are an indication of the horse's age up to eight years. The indication marks in the lower jaw are nearly worn out in the central incisors at six years, in the lateral at seven years, and in the corner incisors at eight years old (*Plate XXVI. and text*). In an old horse, with well-formed teeth, artificial marks are sometimes burned in, to give the animal the appearance of being young. This process is called *Bishoping* (so named from the man Bishop, who introduced it), but it is readily detected, as the enamel round the depressions is destroyed in the operation. At the age of from nine to ten years the teeth change their shape, and begin to turn *triangular* and long. At ten years the upper corner incisor on the outer aspect presents at the top, close to the gum, a *dark yellow groove*, which, as the horse grows older, extends down the middle of the tooth until, at the age of twenty-one years, it reaches the bottom. When this mark is present—for it is not always so—it is a very good indication of the age; but see *Plate XXVII. and text*, which is after 'Galvayne.'

347. The **Number of Teeth** in our domestic animals is as follows:

Animal.	Incisors.	Canines.	Anterior Premolars.	Pre-molars.	Molars.	Total.
Horse ...	6	4	—	6	6	40
Ox ...	6	4	—	6	6	32
Sheep ...	6	4	—	6	6	32
Dog ...	6	4	6	6	6	42
Pig ...	6	4	6	6	6	44

The top figures represent the upper jaw and the lower figures the under jaw.

348. If there is one thing more than another that should command the attention of the country practitioner, it is dentition. The condition of the teeth at times creates various disorders, disease,